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Report on Toxic/Hazardous Organic Compounds in the Wabash River Basin

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REPORT ON
TOXIC/HAZARDOUS ORGANIC COMPOUNDS IN THE WABASH RIVER BASIN

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16. ABSTRACT

Previous organics studies in the Wabash River Basin are reviewed and summarized, and all existing toxic/hazardous organics data from USEPA, Indiana State Board of Health, and Illinois EPA are gathered, condensed, and presented. These include industrial and municipal point source data, ambient river and stream data, fish data, carbon filter data, sludge and sediment data, and public water supply data. Major municipal, industrial, and federal known or potential dischargers of toxic/hazardous organics are listed as well as known or potential minor sources. Data are presented in terms of μg/l and lb/da for each compound from each source. A total of 304 sources were analyzed for as many as 78 compounds (not all compounds for all sources). Compounds are ranked in decreasing order of magnitude (lb/da) discharged from all sources tested. Eleven conclusions and/or recommendations are presented. A bibliography with 16 references is appended, as is a glossary of 78 toxic/hazardous organic compounds. Five appendixes are included, giving excerpts from previous reports; industrial categories used in selecting potential municipal sources; various types of data; and locations of major surface public water supplies in the Basin. (microgram/l

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REPORT ON
TOXIC/HAZARDOUS ORGANIC COMPOUNDS IN THE
WABASH RIVER BASIN

PHASE I

Introduction

A study strategy was prepared in March 1976 for investigating toxic/hazardous organic compounds in the Wabash River Basin. The strategy proposed a three-phase implementation of the survey. This document comprises Phase I of the study which was undertaken and completed except for some special analytical work still in progress. Over the past several years, organics sampling and analyses have revealed widespread organics contamination in the basin including plasticizers, synthetic organic compounds, pesticides, and PCBs.

Purpose

The purpose of this document is to gather, condense, and present all available ambient and point source organics data in the Wabash River Basin to generate an interim assessment of the problem and provide input for programming further sampling, analyses, and data evaluation.

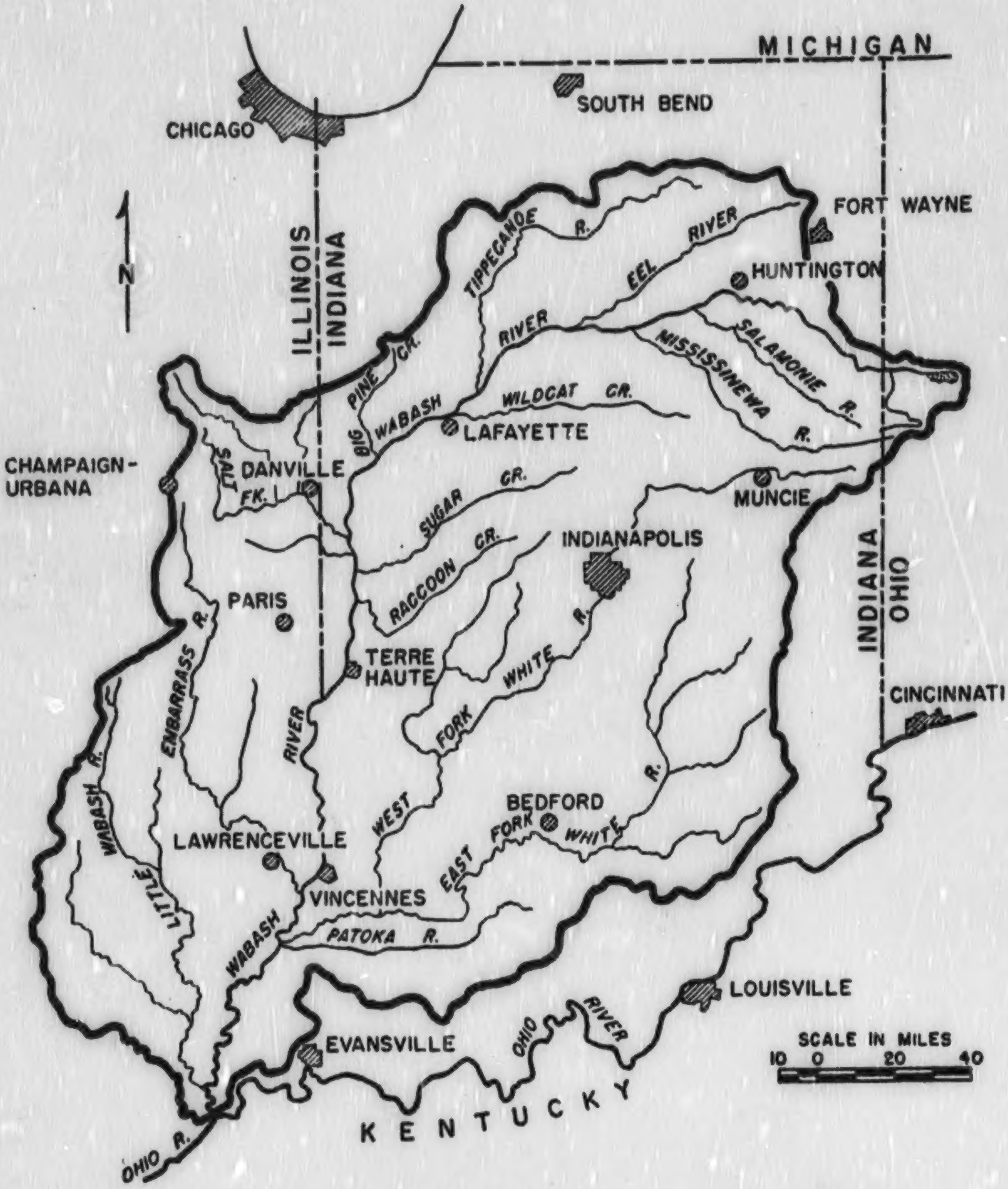
Since resources will not be available for continuing the investigations as outlined in the initial study strategy, subsequent work will have to be planned, funded and conducted as part of on-going State and USEPA water pollution control programs.

Discussion

Background

Pollution of the surface waters in the Wabash River Basin by organic compounds has been documented prior to 1971 in Appendix F of the Wabash River Basin Comprehensive Study (1). An outline of the Basin is shown in Figure 1. The summary of the above study contains the following statements: (pages xv and xix)

> "...Problems from Industrial Wastewaters...
>
> "(c) Pesticides. Very high concentrations of chlordane, a pesticide, have been found in Mill Creek and a tributary which drains a chemical industry at Marshall, Illinois. Samples taken from the stream near the plant on 31 May 1968, showed chlordane concentrations of 11 micrograms per liter in the water and 112,000 to 173,000 micrograms per kilogram of air-dried bottom muds, even though the industry has


MICHIGAN
SOUTH BEND
CHICAGO
FORT WAYNE
ILLINOIS
INDIANA
N
TIPPECANOE R.
EEL RIVER
HUNTINGTON
RIVER
SALAMONIE R.
MISSISSINEWA R.
BIG PINE CR.
WABASH
WILDCAT CR.
LAFAYETTE
CHAMPAIGN-URBANA
SALT FK.
DANVILLE
SUGAR CR.
MUNCIE
RACCOON CR.
INDIANAPOLIS
INDIANA
OHIO
PARIS
EMBARRASS R.
TERRE HAUTE
WHITE R.
FORK
RIVER
CINCINNATI
WABASH R.
LITTLE WABASH
WEST
BEDFORD
EAST FORK WHITE R.
LAWRENCEVILLE
VINCENNES
WABASH
PATOKA R.
LOUISVILLE
EVANSVILLE
OHIO RIVER
SCALE IN MILES
10 0 20 40
KENTUCKY
OHIO R.

WABASH RIVER BASIN

TOTAL DRAINAGE AREA 33,100 SQ. MI.

FIGURE I

COURTESY ILL. STATE WATER SURVEY DIVISION AND IND. FLOOD CONTROL AND WATER RESOURCES COMM.

> installed a deep-well disposal system for toxic wastes. A continuing monitoring program is needed on Mill Creek.
>
> "...Agricultural Contributions to Water Pollution...
>
> "(c) Pesticides. At present, not enough data are available to determine more than the existence of an agricultural pesticide problem in the basin, certainly not its extent nor severity. Chlordane and dieldrin were detected in water samples from four small rural Indiana watersheds. Dieldrin has been detected in the Wabash River at New Harmony."

In addition, the same study recommended (page xxi), "That the present (1971) water quality monitoring systems of the Wabash River Basin be expanded to include ... a more extensive pesticide monitoring program ... and ... studies of unforeseen specific problems that may arise in the future."

Sophisticated analytical techniques which have been developed during the past few years have revealed the presence of a host of complex organic compounds in the environment which are either hazardous and/or toxic, or potentially so. Some of the compounds such as PCBs, have only recently been discovered in the environment although the compounds have been used commercially for many years. Toxicity of such compounds remains to be fully evaluated. Many of these compounds have been detected in the Wabash River Basin, either under ambient conditions or as constituents of point source discharges.

This report does not intend nor purport to imply that the Wabash River Basin is the only basin in the United States which has extensive organics contamination. In fact, other basins may have significantly more organics contamination depending on location with respect to and concentration of industrial complexes. This report was written because it was felt that the concentrations of organics found in the Wabash River Basin were of sufficient magnitude to warrant concern.

However, it should be pointed out that, for the compounds mentioned and discussed in this report (see Glossary and Tables IV and V), whereas toxicity data have been developed for exposure to test animals, such levels have not been established for humans. It is not the purpose of this report to assess nor extrapolate human toxicity levels for any of the compounds discussed herein.

Previous Reports

One of the early studies of specific organic chemical identification in the Wabash River Basin was performed by the Indiana District Office of the USEPA and was presented in a report by Robert D. Kleopfer (2).

This study revealed the presence of the organic chemicals shown in Table I.

The picoline data was quantified and is presented in Table II. The concentration of 160 μg/l in the Indianapolis Belmont Street plant effluent represents a very significant loading of 130 lbs/day to the White River. The source(s) of picolines being discharged to the White River needs further investigation and verification.

Another organic chemical study was undertaken by the Indiana District Office, USEPA, from May through November 1974. The results were presented in a preliminary report, "Organic Chemicals in the Wabash and Lower Ohio River Basins, May-November 1974" by Michael H. Birch (3). Excerpts from the results of this study for the Wabash River Basin are presented in Appendix A. The report found widespread organic chemical contamination in the Wabash River Basin.

As part of a reconnaissance study on environmental levels of nitrosamines in the Central United States, still another study was performed by USEPA, INDO and Denver NEIC of nitrosamines in the discharges from Eli Lilly and Company, Lafayette, Indiana from September through December 1976 (8). As nitrosamines are associated with certain chemical production processes at Eli Lilly, it was suspected that the plant discharges might contain such compounds. This study together with subsequent testing has confirmed that nitrosamines are present in the two major discharges, 001 and 002. Control of the nitrosamine discharges has been initiated through the NPDES permit modification process.

Point Source Discharges - Municipalities*

The following "major" municipal wastewater treatment plants in the Wabash River Basin were determined to be either known or potential discharges of toxic/hazardous organic chemicals. These were determined primarily based on available data and/or what types of industries were located in or close to the cities in question. Types of industries and potential for organic chemical discharges were determined from "Worksheets for Potential Organics Dischargers in Indiana" (4), "Directory of Chemical Producers -- U.S.A." (5), "Illinois Manufacturers Directory" (6), and "The Indiana Industrial Directory" (7). The critical categories used to determine potential toxic/hazardous industrial dischargers are presented in Appendix B. The following municipal wastewater treatment plants are classified as "major" dischargers for NPDES permit program purposes.

(Continued on Page 7)

---

*Listing may not be complete. Subject to verification.

TABLE I

ORGANIC COMPOUNDS FOUND IN THE WABASH RIVER (1971-72)

COMPOUND	COMMENTS
Picolines	Used as solvent; intermediate in the dye and resins industries.
Acenaphthene substituted with two saturated carbons	An aromatic hydrocarbon.
Methylnaphthalene	An aromatic hydrocarbon.
Toluene	An aromatic hydrocarbon.
Benzene substituted with two saturated carbons	Xylene, ethylbenzene. Aromatic hydrocarbons.
Benzene substituted with three saturated carbons.	Aromatic hydrocarbons.
Benzene substituted with four saturated carbons.	Aromatic hydrocarbons.
Naphthalene substituted with three saturated carbons	Aromatic hydrocarbons.
Acenaphthylene	An aromatic hydrocarbon.
n-Nonane	A saturated hydrocarbon.
n-Decane	A saturated hydrocarbon.
n-Undecane	A saturated hydrocarbon.
n-Dodecane	A saturated hydrocarbon.
Ethylphenol	A potential taste and odor causing compound.
Caffeine	An alkaloid found in coffee, tea, and soft drinks.
Several unidentified hydrocarbons	Probably from petroleum or petroleum products.

TABLE II

PICOLINES IN THE WABASH AND WHITE RIVERS (1971-72)

Sample Location	Date	Picoline Found(μg/1)
Wabash River - New Harmony	12/6-20/71	2
Wabash River - Mount Carmel*	1/20/72	4
Wabash River - Vincennes**	1/21/72	<2
White River - U.S. 41	1/21/72	17
Indianapolis STP #1 (Belmont)	1/25/72	160
Indianapolis STP #2 (Southport)	1/25/72	<10
Speedway STP	1/25/72	<10

---

* 4 μg/1 was found in the sample taken 100 yards upstream from Greathouse Creek in mixing zone of Wabash and White Rivers. Picolines were not detected (<2 μg/1) in a sample taken at the Mount Carmel water intake.

** Above confluence of White and Wabash Rivers.

Indiana

Anderson
Bedford
Beech Grove
Bloomington (South Plant)
Bluffton
Columbus
Crawfordsville
Elwood
Frankfort
Franklin
Greenfield
Greensburg
Huntington
Indianapolis (Belmont Plant)
Indianapolis (Southport Plant)
Jasper
Kokomo
Lafayette
Lawrence
Logansport
Marion
Muncie Sanitary District
New Castle
Noblesville
Peru
Plainfield
Princeton
Seymour
Shelbyville
Terre Haute
Tipton

Illinois

Charleston
Danville
Effingham
Mattoon
Mount Carmel
Paris (South Plant)
Rantoul (East Plant)
Urbana-Champaign (Northeast Plant)

In addition to the above, the following list of "minor" wastewater treatment plants was developed in like manner. It should be emphasized that these are "minor" dischargers as defined under the NPDES permit program, not necessarily in terms of their potential toxic/hazardous chemicals discharges.

Indiana

Acton
Akron
Albany
Alexandria
Andrews
Attica
Bloomington
Bourbon
Brazil
Brownstown
Burket
Carthage
Churubusco
Clinton
Covington
Edinburg
Gosport
Hartford City (East Plant)
Huntingburg
Lagro
Laketon
Lebanon
Leesburg
Linton
Lynn
Matthews
McCordsville
Medora
Midland
Mitchell

Indiana (Continued)

Montpelier
Morristown
New Augusta
Newport
North Manchester
North Webster
Oakland City
Portland
Redkey
Rockville
Rushville
Shelburn
South Whitley
Spencer
Sullivan
Union City
Upland
Veedersburg
West Baden Springs
Westfield
Winamac
Winchester
Worthington
Zionsville

Illinois

Carmi
Fairfield
Flora
Hoopeston
Lawrenceville
Marshall (East Plant)
Marshall (West Plant)
Olney
Paris (North Plant)
Paxton
Robinson
Tuscola (North Plant)
Tuscola (South Plant)

State of Indiana and USEPA sampling surveys have verified the fact that five Indiana industries are discharging various toxic/hazardous organic materials to municipal systems. These data are presented in Table III. Unfortunately, only one of these STPs, Bloomington South, has been tested to verify the presence of the organics being discharged to the Wabash River Basin. In the case of Bloomington South STP. PCBs were verified in the effluent at a level of 19-33.9 μg/l as Aroclor 1242/1016. The source of these PCBs has been confirmed as Westinghouse Corporation.

Compliance monitoring survey data for organics in municipal discharges are discussed in a subsequent section.

Point Source Discharges - Industries*

The following "major" dischargers have been identified as known or potential direct contributors of toxic/hazardous organic chemicals to the Wabash River Basin. These are all major dischargers under the NPDES permit program.

---

*Listing may not be complete. Subject to verification

Indiana

Commercial Solvents, Terre Haute (IMC Chemical Group, Inc.)
Delta Faucet, Greensburg
Detroit Diesel Allison, Indianapolis (GMC)
Eli Lilly and Company, Clinton
Eli Lilly and Company, Lafayette
Extruded Alloys, Bedford
Industrial Liquid Waste Disposal, Columbus
Inland Container Corp., Newport
International Harvester, Indianapolis
Laketon Asphalt, Laketon
Mid-States Steel and Wire, Crawfordsville
Minnesota Mining and Manufacturing, Hartford City
Morgan Packing Company, Austin
Olin Corporation, Covington
Pfizer, Inc., Terre Haute
Weston Paper and Manufacturing Company, Terre Haute

Illinois

Cabot Corp., Tuscola
Flintkote Company, Mount Carmel
Marathon Oil Company, Robinson
Sparton Manufacturing Company, Flora
Texaco, Inc., Lawrenceville

Additionally, the following power plants, all designated as "major" dischargers under the NPDES permit program have been known or are potential dischargers of phenolics and/or PCBs:

Indiana

Crawfordsville Power and Light, Crawfordsville
Hoosier Energy, Petersburg
Indianapolis Power and Light, Petersburg
Indianapolis Power and Light, Stout
Indianapolis Power and Light, Pritchard
Indianapolis Power and Light, Perry K
Indiana-Michigan Electric, Breed
Logansport Electric, Logansport
Peru Electric, Peru
Public Service Indiana, Noblesville
Public Service Indiana, Edwardsport
Public Service Indiana, Cayuga
Public Service Indiana, Wabash

Illinois

Central Illinois Public Service, Hutsonville
Central Illinois Public Service, Jasper County
Illinois Power Company, Vermilion County

In addition to the above "major" dischargers, the following "minor" industrial and federal dischargers have been identified as known or potential direct dischargers of toxic/hazardous organic materials in the Wabash River Basin:

Indiana

Active Products, Marion
Alcoa, Lafayette
Allegheny Ludlum Steel Corp., New Castle
American Hose Division, Lectron Products, Winchester
Anaconda Co., Wire and Cable Division, Mario
Anaconda Aluminum Co., Terre Haute
Anaconda Wire and Cable Co., Anderson
Baltimore and Ohio Railroad, Washington
Bohn Aluminum and Brass Corp., Greensburg
Bridgeport Brass Company, Indianapolis
CBS Records Division, CBS, Inc., Terre Haute
Celotex Corp., Lagro
Certainteed Products, Shelbyville
Chrysler Corp., Kokomo
Chrysler Corp., Indianapolis Foundry, Indianapolis
ConRail, Plainfield
Container Corp. of America, Carthage
Crane Naval Ammunition Depot, Crane
Cummins Engine Co., Columbus
Dalton Foundries, Warsaw
Dana Corp., Churubsco
Datavue Products, Wabash
Delco Electronics Div., GM Corp., Kokomo
Delco Remy, Anderson
Dow Chemical Co., Zionsville
Eli Lilly and Company, Greenfield
Eli Lilly and Company, Kentucky Avenue Plant, Indianapolis
Eli Lilly and Company, McCarty Street Plant, Indianapolis
Emconite Division, Amerace Corp., Medora
Engineering Research, Inc., Indianapolis
Essex Castings, Columbus
Essex International, Andrews
Ethyl Visqueen Division, Ethyl Corp., Terre Haute
Ex-Cell-O Corp., Elwood

Indiana (Continued)

Federal Fertilizer Sales Corp., Peru
Firestone Industrial Products, Noblesville
FMC, Bearing Division, Indianapolis
Formica Corp., Frankfort
Futurex Industries, Bloomingdale
Gatke Corp., Warsaw
General Electric, Linton
General Electric Co., Shelbyville
General Tire and Rubber, Marion
General Tire and Rubber Company, Wabash
GM Central Foundry, Bedford
Grissom Air Force Base, Bunker Hill
Harrison Steel Castings, Attica
Hercules, Inc., Terre Haute
H. O. Canfield Company, Seymour
Indiana Molding, Huntington
Indiana Steel and Wire, Muncie
Ingersoll Steel Division, Borg Warner Corp., New Castle
Ingram-Richardson, Inc., Frankfort
ITT Hoffman Specialty Manufacturing, Indianapolis
Johns-Manville Products, Alexandria
KCL Corp., Shelbyville
Kieffer Paper Mills, Brownstown
Kunkle Foundry Company, Andrews
L&N Railroad, Lafayette
Mallory Controls Division, P. R. Mallory & Company, Frankfort
Mid-States Rubber Products, Princeton
Morgan Packing Company, Brownstown
Newport Army Ammunition Plant, Newport
Norfolk and Western Railroad, Frankfort
Norplex Division, Universal Oil Products, Franklin
Overmyer Corp., Winchester
Penn-Dixie Steel Company, Kokomo
Plymouth Tube Division, Van Pelt Corp., Winamac
Potter-Brumfield Div., AMF, Inc., Princeton
P. R. Mallory Co., Indianapolis
Radio Materials Company, Div. of P. R. Mallory, Attica
Rexham Corp., Edinburg
Rock Island Refining Corp., New Augusta
Robinson Industries, McCordsville
Rostone Corp., Lafayette
R. R. Donnelly & Sons, Warsaw
Sheller-Globe Corp., Montpelier
Sheller-Globe Corp., Portland
Stellite Division, Cabot Corp., Kokomo
Sterling Casting Corp., Bluffton
S.U.S. Die Casting, Logansport
Union Carbide, Indianapolis
Uniroyal, Indianapolis

Indiana (Continued)

Vincennes Paper Mill, Vincennes
Wabash Alloys, Wabash
Warsaw Black Oxide Co., Burket
Western Electric Co., Indianapolis
Westinghouse Electric Corp., Muncie

Illinois

Allied Chemical Corp., Danville
American Can Company, Hoopeston
AMF, Inc., Olney
Anaconda Brass Div., Anaconda Metal Hose, Mattoon
Bohn Aluminum and Brass, Danville
Briggs Manufacturing Div., Celotex Corp., Robinson
Chanute Air Force Base, Rantoul
Federal Division, Unarco Industries, Inc., Paris
General Electric, Danville
General Electric, Mattoon
GM Central Foundry, Danville
Illinois Central Railroad, Champaign
Peterson/Puritan, Inc., Danville
Sparton Manufacturing Company, Flora
Velsicol Chemical Corp., Marshall

These lists were prepared using latest available guides, such as industrial catalogs, NPDES permit listings, and chemical producer directories. Some of these industries have been sampled and are known to discharge toxic/hazardous organics. Others are potential sources, and are ranked in order of significance. Still others which are probably discharging such organics have been inadvertently omitted due to the inaccuracies and lack of completeness of the reference materials at hand.

Point Source Data

Toxic/hazardous organic chemical data from point source dischargers in the basin are presented in Table IV. These data were obtained from USEPA compliance monitoring and special study reports, the Indiana State Board of Health, the Illinois EPA, and in a few cases, NPDES permit applications and/or effluent limits. Additional point source data are presented in Appendix C, extracted from Reference No. 3. In order to familiarize readers with the organic compounds in this report, a glossary has been prepared and is included following the Appendixes. The glossary was prepared utilizing References Numbers 10-16.

The toxic/hazardous organic chemicals evaluated in this study are presented in Table V in descending order of magnitude in terms of approximate loadings in pounds per day. These are approximate orders of magnitude only, since incomplete data exist in the first place, and since samples were not collected concurrently except for a few instances.

(Continued on Page 28)

TABLE III

INDIANA INDUSTRIES DISCHARGING TOXIC/HAZARDOUS ORGANIC CHEMICALS TO MUNICIPAL SEWERAGE SYSTEMS (WABASH RIVER BASIN)

Industry	Location	Organic(s) Discharged	Concentration (μg/1)	Sampling Date	Sampled by
GM Delco Battery	Muncie	Aroclor 1248	1.17	5-20-76	USEPA
Thermoset Plastics	Indianapolis	Mirex	3.0	10-28-76	USEPA
Thermoset Plastics	Indianapolis	Kepone	6.0	10-28-76	USEPA
Westinghouse Corp.	Bloomington	Aroclor 1242/1016	80	1-22-76	USEPA
Westinghouse Corp.	Bloomington	Aroclor 1254	0.343	1-22-76	USEPA
Westinghouse Corp.	Bloomington	Aroclor 1242/1016	2,600	3-11-76	ISBH
Westinghouse Corp.	Bloomington	Aroclor 1242/1016	4,900	4-29-76	ISBH
Westinghouse Corp.	Bloomington	Aroclor 1242/1016	220	12-7-76	ISBH
Westinghouse Corp.	Bloomington	Aroclor 1254	0.65	12-7-76	ISBH
Container Corp.	Wabash	Aroclor 1254	0.744	8-25-76	ISBH
Chrysler Corp.	New Castle	Aroclor 1254	4.27	8-10-76	ISBH

4913 - Buff
8813 - Green
4213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN
(USEPA Data Unless Otherwise Noted)

	Date	Discharger	1 Flow (MGD)	2 Hexachlorobenzene	(β BHC) β Benzene Hexachloride	4 Lindane
1	3-30-76	Eli Lilly, Clinton, IN	2.79	<.02	<.02	<.02
2	9-30-75	Eli Lilly, Lafayette, IN (001) (compos.)	7.74	--	--	--
3	9-30-75	Eli Lilly, Laf.,IN (001) (avg. of 5 grabs)	7.74	--	--	--
4	9-30-75	Eli Lilly, Laf.,IN (002) (compos.)	0.666	--	--	--
5	9-30-75	Eli Lilly, Laf.,IN (002) (avg.of 5 grabs)	0.666	--	--	--
6	9-30-75	Eli Lilly, Laf.,IN (003) (compos.)	0.019	--	--	--
7	9-30-75	Eli Lilly, Laf.,IN (003) (avg.of 5 grabs)	0.019	--	--	--
8	11-12-75	Weston Paper,Terre Haute,IN(001)(2 grabs)	1.22	<.002	.0025/.0000	.0015/.0000
9	11-12-75	Weston Paper,T.Haute (002)(avg. 2 grabs)	1.39	<.002	<.005	.001/.0000
10	11-12-75	Weston Paper,T.Haute (004)(avg. 2 grabs)	0.06	<.002	<.005	<.002
11	11-5-75	Commercial Solvents,T.Haute (001)	0.356	<.002	<.005	<.002
12	11-5-75	Commercial Solvents,T.Haute (002)	1.88	<.002	<.005	<.002
13	11-5-75	Commercial Solvents,T.Haute (003)	2.38	<.002	<.005	.003/.0001
14	11-4-75	Pfizer, T. Haute (Area 1000 stream)	0.88	<.002	<.005	<.002
15	11-4-75	Pfizer, T. Haute (Area 1100 stream)	2.42	<.002	<.005	<.002
16	11-4-75	Pfizer, T. Haute (Retention Box)	1.2	<.002	<.005	<.002
17	11-4-75	Pfizer, T. Haute (001)	5.15	<.002	<.005	<.002
18	7-19-76	Inland Container, Newport, IN	0.80	<.02	<.02	<.02
19	4-22-75	Morgan Packing, Austin, IN	0.236	<.002	<.005	<.002
20	11-76	Flora, IL STP (State Data)	.80	--	--	--
21	11-76	Robinson, IL STP " "	.80	--	--	--
22	11-76	Effingham, IL STP " "	2.1	--	--	--
23	11-76	Briggs Mfg. Co., Robinson,IL " "	.045	--	--	--
24	11-76	Mt. Carmel, IL STP " "	1.5	--	--	--
25	11-76	Carmi, IL STP " "	.675	--	--	--
26	11-76	Lawrenceville, IL STP " "	1.0	--	--	--
27	11-76	Flintkote, Mt. Carmel, IL " "	.60	--	--	--
28	11-76	Texaco, Lawrenceville, IL " "	4.9	--	--	--
29	11-76	AMF, Olney, IL " "	.40	--	--	--
30	11-76	Fairfield, IL STP " "	.60	--	--	--
31	11-76	Olney, IL STP " "	2.26	--	--	--
32	6-2-76	AMF, Olney, IL " "	.396	--	--	--
33	6-29-76	Anaconda Brass, Mattoon, IL " "	.008	--	--	--
34	7-14-76	Anaconda Brass, Mattoon, IL " "	.008	--	--	--
35	6-2-76	Briggs Mfg., Robinson, IL " "	.05	--	--	--
36	6-2-76	Carmi STP (IL) " "	.60	--	--	--
37	6-28-76	Champaign-Urbana, IL (NE) " "	10.0	--	--	--
38	6-8-76	Chanute AFB, IL " "	1.0	--	--	--
39	7-15-76	Chanute AFB, IL " "	1.0	--	--	--
40	3-25-76	Charleston, IL STP " "	4.61	--	--	--
41	7-13-76	Charleston, IL STP " "	4.61	--	--	--
42						

14

Note: If less than detectable limit was found, only the concentration (μg/l) is given; if detectable amount was found, both the concentration (μg/l) and the loading (lb/da) are given.

5 Trifluralin (Treflan)	6 Aldrin	7 Zytron	8 Isodrin	9 Heptachlor epoxide	10 γChlordane	11 o,p DDE	12 p,p' DDE	13 o,p DDD	
<.02	<.02	<.02	<.03	<.02	<.02	<.03	<.03	<.03	1
.82/.053	--	--	--	--	--	--	--	--	2
1.27/.082	--	--	--	--	--	--	--	--	3
<.002	--	--	--	--	--	--	--	--	4
.186/.001	--	--	--	--	--	--	--	--	5
<.002	--	--	--	--	--	--	--	--	6
.003/.0000	--	--	--	--	--	--	--	--	7
.0055/.0001	<.002	<.002	--	<.002	<.002	<.003	<.003	<.003	8
<.002	<.002	<.002	--	<.002	.001/.0000	<.003	<.003	<.003	9
.002/.0000	<.002	<.002	--	<.002	<.002	<.003	<.003	<.003	10
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	11
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	12
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	13
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	14
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	15
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	16
<.002	<.002	--	--	<.002	<.002	<.003	<.003	<.003	17
.24/.002	<.02	<.05	<.05	<.02	--	<.03	<.03	<.03	18
<.002	<.002	<.005	<.003	<.002	<.002	<.003	<.003	<.003	19
--	--	--	--	.016/.0001	--	--	--	--	20
--	--	--	--	.015/.0001	--	--	--	--	21
--	--	--	--	.014/.0002	--	--	--	--	22
--	--	--	--	<.01	--	--	--	--	23
--	--	--	--	.025/.0003	--	--	--	--	24
--	--	--	--	.023/.0001	--	--	--	--	25
--	--	--	--	.013/.0001	--	--	--	--	26
--	--	--	--	<.01	--	--	--	--	27
--	--	--	--	<.01	--	--	--	--	28
--	--	--	--	<.01	--	--	--	--	29
--	--	--	--	<.01	--	--	--	--	30
--	--	--	--	<.01	--	--	--	--	31
--	--	--	--	.021/.0001	--	--	--	--	32
--	--	--	--	<.01	--	--	--	--	33
--	--	--	--	<.01	--	--	--	--	34
--	--	--	--	<.01	--	--	--	--	35
--	--	--	--	.08/.0004	--	--	--	--	36
--	--	--	--	<.01	--	--	--	--	37
--	--	--	--	<.01	--	--	--	--	38
--	--	--	--	.018/.0002	--	--	--	--	39
--	--	--	--	<.01	--	--	--	--	40
--	--	--	--	<.01	--	--	--	--	41
									42

4913 - Buff
8913 - Green
4213 - [illegible]

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger		1 Flow (MGD)	2 Hexachlorobenzene	(β BHC) β Benzene Hexachloride	4 Lindane
6-28-76	Danvile, IL STP	(State Data)	8.2	--	--	--
6-2-76	Effingham, IL STP	" "	2.11	--	--	--
6-2-76	Fairfield, IL STP	" "	.70	--	--	--
6-2-76	Flintkote, Mt. Carmel, IL	" "	.60	--	--	--
6-2-76	Flora, IL STP	" "	.50	--	--	--
6-28-76	G. E., Danville, IL	" "	.03	--	--	--
6-29-76	G. E., Mattoon, IL	" "	.01	--	--	--
7-14-76	G. E., Mattoon, IL	" "	.01	--	--	--
6-28-76	GM Central Foundry, Danville, IL	" "	8.0	--	--	--
6-2-76	Lawrenceville, IL STP	" "	.65	--	--	--
6-2-76	Marathon Oil, Robinson, IL	" "	2.8	--	--	--
6-11-76	Marshall, IL East STP	" "	.21	--	--	--
7-8-76	Marshall, IL East STP	" "	.21	--	--	--
6-11-76	Marshall, IL West STP	" "	.31	--	--	--
7-8-76	Marshall, IL West STP	" "	.31	--	--	--
7-14-76	Mattoon, IL STP	" "	3.44	--	--	--
6-29-76	Mattoon, IL STP	" "	3.44	--	--	--
6-2-76	Mt. Carmel, IL STP	" "	1.5	--	--	--
6-2-76	Olney, IL STP	" "	2.26	--	--	--
6-11-76	Paris, IL North STP	" "	.79	--	--	--
7-8-76	Paris, IL North STP	" "	.79	--	--	--
6-11-76	Paris, IL South STP	" "	1.7	--	--	--
7-8-76	Paris, IL South STP	" "	1.7	--	--	--
6-8-76	Rantoul, IL East STP	" "	2.74	--	--	--
7-15-76	Rantoul, IL East STP	" "	2.74	--	--	--
6-2-76	Robinson, IL STP	" "	.75	--	--	--
6-2-76	Texaco, Lawrenceville, IL	" "	2.6	--	--	--
6-25-76	Tuscola, IL North STP	" "	.34	--	--	--
6-25-76	Tuscola, IL South STP	" "	.41	--	--	--
6-8-76	Chanute AFB Test Cell	" "	.003	--	--	--
7-15-76	Chanute AFB Test Cell	" "	.003	--	--	--
6-28-76	GM Central Foundry, Danville, IL	" "	.07	--	--	--
6-28-76	GM Central Foundry, Danville, IL	" "	.003	--	--	--

p. 1
(cont'd)
of 6

5	6	7	8	9	10	11	12	13	
(Trifluralin) Treflan	Aldrin	Zytron	Isodrin	Heptachlor epoxide	γ Chlordane	o,p DDE	p,p' DDE	o,p DDD	
--	--	--	--	<.01	--	--	--	--	1
--	--	--	--	.02/.0004	--	--	--	--	2
--	--	--	--	.016/.0001	--	--	--	--	3
--	--	--	--	.029/.0001	--	--	--	--	4
--	--	--	--	<.01	--	--	--	--	5
--	--	--	--	.039/.0000	--	--	--	--	6
--	--	--	--	<.01	--	--	--	--	7
--	--	--	--	<.01	--	--	--	--	8
--	--	--	--	<.01	--	--	--	--	9
--	--	--	--	.05/.0003	--	--	--	--	10
--	--	--	--	<.01	--	--	--	--	11
--	--	--	--	.15/.0003	--	--	--	--	12
--	--	--	--	--	--	--	--	--	13
--	--	--	--	--	--	--	--	--	14
--	--	--	--	.16/.0004	--	--	--	--	15
--	--	--	--	.012/.0003	--	--	--	--	16
--	--	--	--	.015/.0004	--	--	--	--	17
--	--	--	--	.036/.0005	--	--	--	--	18
--	--	--	--	<.01	--	--	--	--	19
--	--	--	--	<.01	--	--	--	--	20
--	--	--	--	<.01	--	--	--	--	21
--	--	--	--	.02/.0003	--	--	--	--	22
--	--	--	--	.039/.0006	--	--	--	--	23
--	--	--	--	.019/.0004	--	--	--	--	24
--	--	--	--	.011/.0003	--	--	--	--	25
--	--	--	--	--	--	--	--	--	26
--	--	--	--	<.01	--	--	--	--	27
--	--	--	--	.01/.0000	--	--	--	--	28
--	--	--	--	.02/.0001	--	--	--	--	29
--	--	--	--	<.01	--	--	--	--	30
--	--	--	--	<.01	--	--	--	--	31
--	--	--	--	<.01	--	--	--	--	32
--	--	--	--	<.01	--	--	--	--	33
									34
									35
									36
									37
									38
									39
									40
									41
									42

15-a

4913 - Buff
8913 - Green
4213 - White

TABLE IV

ORGANICS DISCHARGED TO WABASH R. BASIN

	Date	Discharger	1 o,p DDT	2 p,p' DDD	3 p,p' DDT	4 Carbo-phenothion
1	3-30-76	Eli, Lilly, Clinton, IN	< .03	< .03	< .03	<.03
2	11-12-75	Weston Paper, T.Haute(001)(avg. 2 grabs)	<.003	--	<.003	--
3	11-12-75	Weston Paper, T.Haute(002)(avg. 2 grabs)	<.003	--	<.003	--
4	11-12-75	Weston Paper, T.Haute(004)(avg. 2 grabs)	<.003	--	.0035/.0000	--
5	11-5-75	Commercial Solvents, T.Haute (001)	<.003	--	<.003	--
6	11-5-75	Commercial Solvents, T.Haute (002)	<.003	--	<.003	--
7	11-5-75	Commercial Solvents, T.Haute (003)	<.003	--	<.003	--
8	11-4-75	Pfizer, T.Haute (Area 1000 stream)	<.003	--	<.003	--
9	11-4-75	Pfizer, T.Haute (Area 1100 stream)	<.003	--	<.003	--
10	11-4-75	Pfizer, T.Haute (Retention Box)	<.003	--	<.003	--
11	11-4-75	Pfizer, T.Haute (001)	<.003	--	<.003	--
12	7-19-76	Inland Container, Newport, IN	< .03	< .03	< .03	--
13	4-22-75	Morgan Packing, Austin, IN	<.003	<.003	<.003	--
14	11-76	Flora, IL STP (State Data)	--	--	--	--
15	11-76	Robinson, IL STP (State Data)	--	--	--	--
16	11-76	Effingham, IL STP (State Data)	--	--	--	--
17	11-76	Briggs Manuf. Co. (State Data)	--	--	--	--
18	11-76	Mt. Carmel, IL STP (State Data)	--	--	--	--
19	11-76	Carmi, IL STP (State Data)	--	--	--	--
20	11-76	Lawrenceville, IL STP (State Data)	--	--	--	--
21	11-76	Flintkote, Mt. Carmel, IL (State Data)	--	--	--	--
22	11-76	Texaco, Lawrenceville, IL (State Data)	--	--	--	--
23	11-76	AMF, Olney, IL (State Data)	--	--	--	--
24	11-76	Fairfield, IL STP (State Data)	--	--	--	--
25	11-76	Olney, IL STP (State Data)	--	--	--	--
26	6-2-76	AMF, Olney, IL (State Data)	--	--	--	--
27	6-29-76	Anaconda Brass, Mattoon, IL (State Data)	--	--	--	--
28	7-14-76	Anaconda Brass, Mattoon, IL (State Data)	--	--	--	--
29	6-2-76	Briggs Manuf., Robinson, IL (State Data)	--	--	--	--
30	6-2-76	Carmi, IL STP (State Data)	--	--	--	--
31	6-28-76	Champaign-Urbana, IL (NE) (State Data)	--	--	--	--
32	6-8-76	Chanute AFB, IL (State Data)	--	--	--	--
33	7-15-76	Chanute AFB, IL (State Data)	--	--	--	--
34	6-25-76	Charleston, IL STP (State Data)	--	--	--	--
35	7-13-76	Charleston, IL STP (State Data)	--	--	--	--
36	6-28-76	Danville, IL STP (State Data)	--	--	--	--
37	6-2-76	Effingham, IL STP (State Data)	--	--	--	--
38	6-2-76	Fairfield, IL STP (State Data)	--	--	--	--
39	6-2-76	Flintkote, Mt. Carmel, IL (State Data)	--	--	--	--
40	6-2-76	Flora, IL STP (State Data)	--	--	--	--
41	6-28-76	G.E., Danville, IL (State Data)	--	--	--	--
42						

5 Methoxychlor	6 Mirex	7 2,4-D isopropylester	8 DNBP	9 Endosulfan I	10 Dieldrin	11 DEHP	12 Endrin	13 Endosulfan II	
< 1	< 1	< .2	<2	< .5	< .5	<2	< .5	< .5	1
<.01	<.005	--	--	--	<.003	--	--	<.005	2
<.01	<.005	--	--	--	<.003	--	--	<.005	3
<.01	<.005	--	--	--	<.003	--	--	<.005	4
<.01	<.005	--	--	--	<.003	--	--	<.005	5
<.01	<.005	--	--	--	<.003	--	--	<.005	6
<.01	<.005	--	--	--	<.003	--	--	<.005	7
<.01	<.005	--	--	--	<.003	--	--	<.005	8
<.01	<.005	--	--	--	<.003	--	--	<.005	9
<.01	<.005	--	--	--	<.003	--	--	<.005	10
<.01	<.005	--	--	--	<.003	--	--	<.005	11
--	< 1	<.02	--	<.05	< .02	--	<.03	< .05	12
<.01	<.003	.044/.0001	--	<.005	.005/.0006	--	.016/.0000	<.005	13
--	--	--	--	--	.045/.0003	--	--	--	14
--	--	--	--	--	.033/.0002	--	--	--	15
--	--	--	--	--	.039/.0007	--	--	--	16
--	--	--	--	--	.011/.0000	--	--	--	17
--	--	--	--	--	.066/.0007	--	--	--	18
--	--	--	--	--	.079/.0004	--	--	--	19
--	--	--	--	--	.012/.0001	--	--	--	20
--	--	--	--	--	.019/.0001	--	--	--	21
--	--	--	--	--	< .01	--	--	--	22
--	--	--	--	--	.015/.0000	--	--	--	23
--	--	--	--	--	.040/.0002	--	--	--	24
--	--	--	--	--	.023/.0004	--	--	--	25
--	--	--	--	--	.03/.0001	--	--	--	26
--	--	--	--	--	.013/.0000	--	--	--	27
--	--	--	--	--	.023/.0000	--	--	--	28
--	--	--	--	--	.01/.0000	--	--	--	29
--	--	--	--	--	.073/.0004	--	--	--	30
--	--	--	--	--	.014/.0012	--	--	--	31
--	--	--	--	--	< .01	--	--	--	32
--	--	--	--	--	.013/.0001	--	--	--	33
--	--	--	--	--	< .01	--	--	--	34
--	--	--	--	--	.025/.001	--	--	--	35
--	--	--	--	--	.02/.0014	--	--	--	36
--	--	--	--	--	.01/.0002	--	--	--	37
--	--	--	--	--	.013/.0001	--	--	--	38
--	--	--	--	--	.013/.0001	--	--	--	39
--	--	--	--	--	< .01	--	--	--	40
--	--	--	--	--	.021/.0000	--	--	--	41
									42

16-a

8913 - Green
4213 - White

TABLE IV

ORGANICS DISCHARGED TO WABASH R. BASIN

Date	Discharger		1 o,p DDT	2 p,p' DDD	3 p,p' DDT	4 Carbo-phenthion
6-29-76	G.E., Mattoon, IL	(State Data)	--	--	--	--
7-14-76	G.E., Mattoon, IL	(State Data)	--	--	--	--
6-28-76	GM Central Foundry, Danville, IL	(State Data)	--	--	--	--
6-2-76	Lawrenceville, IL STP	(State Data)	--	--	--	--
6-2-76	Marathon Oil. Robinson, IL	(State Data)	--	--	--	--
6-11-76	Marshall, IL East STP	(State Data)	--	--	--	--
7-8-76	Marshall, IL East STP	(State Data)	--	--	--	--
6-11-76	Marshall, IL West STP	(State Data)	--	--	--	--
7-8-76	Marshall, IL West STP	(State Data)	--	--	--	--
7-14-76	Mattoon, IL STP	(State Data)	--	--	--	--
6-29-76	Mattoon, IL STP	(State Data)	--	--	--	--
6-2-76	Mt. Carmel, IL STP	(State Data)	--	--	--	--
6-2-76	Olney, IL STP	(State Data)	--	--	--	--
6-11-76	Paris, IL North STP	(State Data)	--	--	--	--
7-8-76	Paris, IL North STP	(State Data)	--	--	--	--
6-11-76	Paris, IL South STP	(State Data)	--	--	--	--
7-8-76	Paris, IL South STP	(State Data)	--	--	--	--
6-8-76	Rantoul, IL East STP	(State Data)	--	--	--	--
7-15-76	Rantoul, IL East STP	(State Data)	--	--	--	--
6-2-76	Robinson, IL STP	(State Data)	--	--	--	--
6-2-76	Texaco, Lawrenceville, IL	(State Data)	--	--	--	--
6-25-76	Tuscola, IL North STP	(State Data)	--	--	--	--
6-25-76	Tuscola, IL South STP	(State Data)	--	--	--	--
6-8-76	Chanute AFB Test Cell	(State Data)	--	--	--	--
7-15-76	Chanute AFB Test Cell	(State Data)	--	--	--	--
6-28-76	GM Central Foundry, Danville, IL	(State Data)	--	--	--	--
6-28-76	GM Central Foundry, Danville, IL	(State Data)	--	--	--	--

p. 2
(cont'd)
of 6

5 Methoxychlor	6 Mirex	7 2,4-D isopropylester	8 DNBP	9 Endosulfan I	10 Dieldrin	11 DEHP	12 Endrin	13 Endosulfan II	
--	--	--	--	--	.019/.0000	--	--	--	1
--	--	--	--	--	<.01	--	--	--	2
--	--	--	--	--	<.01	--	--	--	3
--	--	--	--	--	.024/.0001	--	--	--	4
--	--	--	--	--	<.01	--	--	--	5
--	--	--	--	--	<.01	--	--	--	6
--	--	--	--	--	<.01	--	--	--	7
--	--	--	--	--	.018/.0000	--	--	--	8
--	--	--	--	--	<.01	--	--	--	9
--	--	--	--	--	.017/.0005	--	--	--	10
--	--	--	--	--	.026/.0007	--	--	--	11
--	--	--	--	--	.037/.0004	--	--	--	12
--	--	--	--	--	.018/.0003	--	--	--	13
--	--	--	--	--	.015/.0001	--	--	--	14
--	--	--	--	--	<.01	--	--	--	15
--	--	--	--	--	.035/.0005	--	--	--	16
--	--	--	--	--	.016/.0002	--	--	--	17
--	--	--	--	--	.027/.0006	--	--	--	18
--	--	--	--	--	.032/.0007	--	--	--	19
--	--	--	--	--	.03/.0002	--	--	--	20
--	--	--	--	--	<.01	--	--	--	21
--	--	--	--	--	.035/.0001	--	--	--	22
--	--	--	--	--	.029/.0001	--	--	--	23
--	--	--	--	--	.013/.0000	--	--	--	24
--	--	--	--	--	.01/.0000	--	--	--	25
--	--	--	--	--	<.01	--	--	--	26
--	--	--	--	--	<.01	--	--	--	27

4913 - Buff
8913 - Green
4213 - White

TABLE IV

ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger	Chlorobenzilate	Phenkapton	EPN	Azinphos Methyl	Phosal
3-30-76	Eli Lilly, Clinton, IN	< 2	<1	<1	<1	<1
4-22-75	Morgan Packing, Austin, IN	<.01	--	--	--	--

p.3
of 6

6 Azinphos Ethyl	7 Coumaphos	8 Phorate	9 Diazinon	10 Dyfonate	11 Ronnel	12 Dursban	13 Methyl Parathion	
<5	<5	<1	<1	<1	<1	<1	<1	1
--	--	--	--	--	--	--	--	2

18-a

4213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger	Phenolics	1 Malathion	2 Ethyl Parathion	3 DEF	4 Ethion	5 Methyle Chlorid
3-30-76	Eli Lilly, Clinton, IN	<10	<1	<1	<1	<1	10/.23
9-30-75	Eli Lilly,Laf.,IN(001)(compos.)	4/.26	--	--	--	--	-- --
9-30-75	Eli Lilly,Laf.,IN(002)(compos.)	68/.38	--	--	--	--	--
9-30-75	Eli Lilly,Laf.,IN(003)(compos.)	90/.014	--	--	--	--	--
11-12-75	Weston Paper,T.Haute(001)(2grabs)	85/.86	--	--	--	--	--
11-12-75	Weston Paper.T.Haute(002)(2grabs)	10/.12	--	--	--	--	--
8-8-74	Weston Paper,T.Haute(004)	40/.014	--	--	--	--	--
11-12-75	Weston Paper,T.Haute(004)(2grabs)	--	--	--	--	--	--
11-5-75	Commercial Solvents,T.Haute(001)	<4	--	--	--	--	--
11-5-75	Commercial Solvents,T.Haute(002)	<4	--	--	--	--	--
11-5-75	Commercial Solvents,T.Haute(003)	<4	--	--	--	--	--
11-4-75	Pfizer,T.Haute(Area 1000 stream)	--	--	--	--	--	--
11-4-75	Pfizer,T.Haute(Area 1100 stream)	--	--	--	--	--	--
11-4-75	Pfizer,T.Haute(Retention Box)	--	--	--	--	--	--
11-4-75	Pfizer,T.Haute(001)	21/.90	--	--	--	--	--
7-31-75	3-M,Hartford City,IN (001)	13/.063	--	--	--	--	--
7-31-75	3-M,Hartford City, IN (002)	5.5/.024	--	--	--	--	--
8-21-74	Uniroyal,Indpls,IN (001)	<2	--	--	--	--	--
8-21-74	Uniroyal,Indpls,IN (002)	<2	--	--	--	--	--
1-21-75	Ingram-Richardson,Frankfort,IN(001)	3.1/.002	--	--	--	--	--
1-22-75	P.R.Mallory,Frankfort,IN(001)	<5	--	--	--	--	--
1-22-75	P.R.Mallory,Frankfort,IN(002)	<5	--	--	--	--	--
1-22-75	P.R.Mallory,Frankfort,IN(003)	<5	--	--	--	--	--
1-21-75	Norfolk&Western,Frankfort,IN(001)	65/.004	--	--	--	--	--
8-21-74	Glass Container Corp.,Indpls(001)	<2	--	--	--	--	--
8-21-74	Glass Container Corp.,Indpls(002)	<2	--	--	--	--	--
8-21-74	Chrysler Corp.,Indpls.(001)	<2	--	--	--	--	--
7-19-76	Inland Container,Newport,IN	--	--	--	--	--	--
5-12-76	Terre Haute, IN STP	13.5/1.13	--	--	--	--	--
5-12-76	Terre Haute, IN STP(digest.sludge)	--	--	--	--	--	--
2-10-76	Ind.-Mich.Breed Sta.,IN(002)	--	--	--	--	--	--
1-29-75	PSI Dresser Sta.,T.Haute,IN(001A)	8/.003	--	--	--	--	--
1-14-75	Winamac,IN STP	4/.01	--	--	--	--	--
8-20-74	Indianapolis Belmont St.,STP	21/17.0	--	--	--	--	--
8-22-74	Indianapolis Southport STP(#1)	<2	--	--	--	--	--
8-22-74	Indianapolis Southport STP(#2)	<2	--	--	--	--	--
8-22-74	Beech Grove, IN STP	3/.03	--	--	--	--	--
7-23-74	Marion, IN STP	6/.313	--	--	--	--	--
7-24-74	Hartford City,IN STP (#1)	11/.12	--	--	--	--	--
7-24-74	Hartford City,IN STP (#2)	<4	--	--	--	--	--

6 Other Chlorinated Volatiles	7 Farsenol	8 Aroclor 1221	9 Aroclor 1242/1016	10 Aroclor 1248	11 Aroclor 1254	12 Aroclor 1260	13 Cyanide	
<5	Present not quantified	<1	<1	<1	<1	<1	750/17.5	1
--	--	--	--	--	--	--	--	2
--	--	--	--	--	--	--	--	3
--	--	--	--	--	--	--	--	4
--	--	<.1	<.1	.15/.002	<.1	<.1	--	5
--	--	<.1	.1/.001	.05/.0006	<.1	<.1	--	6
--	--	--	--	--	--	--	--	7
--	--	<.1	<.1	<.1	<.1	<.1	--	8
--	--	<.1	<.1	<.1	<.1	<.1	20/.06	9
--	--	<.1	<.1	<.1	<.1	<.1	20/.31	10
--	--	<.1	<.1	.2/.004	<.1	<.1	<20	11
--	--	<.1	<.1	<.1	4.2/.03	<.1	--	12
--	--	<.1	<.1	<.1	1.9/.04	<.1	--	13
--	--	<.1	<.1	<.1	1.5/.015	<.1	--	14
--	--	.1/[illegible]	<.1	<.1	1.2/.05	<.1	<40	15
--	--	[illegible]	--	--	--	--	40/.19	16
--	--	<.1	<.1	<.1	<.1	<.1	<40	17
--	--	--	--	--	--	--	--	18
--	--	--	--	--	--	--	--	19
--	--	--	--	--	--	--	--	20
--	--	--	--	--	--	--	--	21
--	--	--	--	--	--	--	--	22
--	--	--	--	--	--	--	--	23
--	--	--	--	--	--	--	--	24
--	--	--	--	--	--	--	--	25
--	--	--	--	--	--	--	--	26
--	--	--	--	--	--	--	--	27
--	--	--	3/.020	<1	<1	<1	--	28
--	--	--	--	--	--	--	30/2.50	29
--	--	--	--	<.2	<.2	<.2	--	30
--	--	.1	<.1	<.1	<.1	<.1	--	31
--	--	--	--	--	--	--	--	32
--	--	--	--	--	--	--	--	33
--	--	--	--	--	--	--	260/211	34
--	--	--	--	--	--	--	170/28.4	35
--	--	--	--	--	--	--	140/23.4	36
--	--	--	--	--	--	--	73/.79	37
--	--	--	--	--	--	--	50/2.6	38
--	--	--	--	--	--	--	25/0.3	39
--	--	--	--		--	--	56/0.21	40
								41
								42

19-a

813 - Buff
813 - Green
3213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger	1 Phenolics	2 Malathion	3 Ethyl Parathion	4 DEF	5 Ethion
4-22-75	Morgan Packing, Austin, IN	--	--	--	--	--
3-26-75	IPALCO, Stout Sta., Indpls. (005)	<10	--	--	--	--
2-12-75	Cabot Corp., Kokomo, IN (001)	< 5	--	--	--	--
2-12-75	Cabot Corp., Kokomo, IN (002)	< 5	--	--	--	--
2-12-75	Cabot Corp., Kokomo, IN (004)	< 5	--	--	--	--
2-12-75	Cabot Corp., Kokomo, IN (004 A)	18/.0003	--	--	--	--
2-12-75	Penn-Dixie Steel, Kokomo (004)	<10	--	--	--	--
2-12-75	Penn-Dixie Steel, Kokomo (005-A)	<10	--	--	--	--
11-19-75	Kieffer P.Mills,Brownstown,IN(001)(ISBHData)	17/.068	--	--	--	--
5-5-76	Hercules, Terre Haute, IN (001)	--	--	--	--	--
1-7-76	B&O RR, Washington,IN (Separator Effl.)	--	--	--	--	--
1-7-76	B&O RR, Washington,IN (Storm Sewer)	--	--	--	--	--
4-8-75	Crane NAD, Crane, IN (STP#1) (001)	<10	--	--	--	--
4-8-75	Crane NAD, Crane, IN (STP#3) (003)	<10	--	--	--	--
5-25-76	Crane NAD, Crane, IN (STP#1) (001)	<10	--	--	--	--
5-25-76	Crane NAD, Crane, IN (Boggs Ck., 006)	<10	--	--	--	--
1-21-76	Bloomington, IN South STP*	--	--	--	--	--
1-21-76	L&S Springs, Monroe Cty, IN(Comb. flow)*	--	--	--	--	--
3-11-76	Bloomington, IN South STP (State Data)	--	--	--	--	--
6-23-76	GM Cent.Foundry, Bedford, IN(001)(State Data)	--	--	--	--	--
6-23-76	GM Cent.Foundry, Bedford, IN(002)(State Data)	--	--	--	--	--
5-15-75	CIPSCO, Hutsonville, IN (001) (Ash pond)	2/.009	--	--	--	--
5-15-75	CIPSCO, Hutsonville, IN (002) (Condenser)	< 2	--	--	--	--
7-6-71	FlintkoteCo,Mt.Carmel,IL (001)(Permit App.)	115/.69	--	--	--	--
9-26-74	TexacoInc,Lawrenceville,IL(001)(Permit)	122/5.0	--	--	--	--
2-24-76	Danville, IL STP	7/.61	--	--	--	--
5-31-73	MarathonOilCo,Robinson,IL(Proposed Permit)	52/1.25	--	--	--	--
4-16-75	Chanute AFB, IL	12/.20	--	--	--	
2-76	Champaign-Urbana, IL (NE)	10/.90	--	--	--	
10-[illegible]-76	Charleston, IL	.9/.015	--	--	--	

*Source of PCB's is Westinghouse Corp.

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(cont'd)
of 6

6 Methylene Chloride	7 Farsenol	8 Aroclor 1221	9 Aroclor 1242/1016	10 Aroclar 1248	11 Aroclor 1254	12 Aroclor 1260	13 Cyanide	
--	--	<.2	<.1	<.1	<.1	<.2	--	1
--	--	--	--	--	--	--	--	2
--	--	--	--	--	--	--	--	3
--	--	--	--	--	--	--	--	4
--	--	--	--	--	--	--	--	5
--	--	--	--	--	--	--	--	6
--	--	--	--	--	--	--	<40	7
--	--	--	--	--	--	--	--	8
--	--	--	--	--	.025/.0001	--	--	9
--	--	<.1	8.9/.013	<.1	<.1	<.1	--	10
--	--	<.1	8.8/.0005	<.1	<.1	<.1	--	11
--	--	<.1	3.8/.0002	<.1	<.1	<.1	--	12
--	--	--	--	--	--	--	<5	13
--	--	--	--	--	--	--	<5	14
--	---	--	--	--	--	--	213/.22	15
--	--	--	--	--	--	--	13/0.39	16
--	--	--	19/1.05	<.1	<.1	<.1	--	17
--	--	--	0.1/.0029	<.1	<.1	<.1	--	18
--	--	--	33.9/2.15	--	--	--	--	19
--	--	--	--		5.8/.005	--	--	20
--	--	--	--	--	76.0/.22	--	--	21
--	--	--	--	--	--	--	<5	22
--	--	--	--	--	--	--	<5	23
--	--	--	--	--	--	--	--	24
--	--	--	--	--	--	--	147/6.0	25
--	--	--	--	--	--	--	9/.78	26
--	--	--	--	--	--	--	--	27
--	--	--	--	--	--	--	<5	28
--	--	--	--	--	--	--	44/3.96	29
--	--	--	--	--	--	--	20/.33	30
								31
								32
								33
								34
								35
								36
								37
								38
								39
								40
								41
								42

20-a

4913 - Buff
8913 - Green
4213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger	1 Dibutyl Phthalate	2 Diethyl Hexyl Phthalate	3 Methyl Amine	4 Total Organics	5 Stearic Acid
11-12-75	Weston Paper, T.Haute(001)(2 grabs)	<1	<1	--	--	--
11-12-75	Weston Paper, T.Haute(002)(2 grabs)	<1	<1	--	--	--
11-12-75	Weston Paper, T.Haute(004)(2 grabs)	<1	<1	--	--	--
11-5-75	Commercial Solvents, T.Haute(001)	<500	<500	--	--	--
11-5-75	Commercial Solvents, T.Haute(002)	<500	<500	--	--	--
11-5-75	Commercial Solvents, T.Haute(003)	<500	<500	34,000/675	--	--
8-21-74	Uniroyal, Indpls. (001)	--	--	--	<.05	--
8-21-74	Uniroyal, Indpls. (002)	--	--	--	--	<50
7-19-76	Inland Container, Newport, IN	1/.007	6.5/.043	--	--	--
8-20-74	Indianapolis Belmont St. STP	--	--	--	<50	<6
8-22-74	Indianapolis Southport STP (#1)	--	--	--	.05/.008	<6
8-22-74	Indianapolis Southport STP (#2)	--	--	--	.05/.008	<6
4-22-75	Morgan Packing, Austin, IN	2.32/.005	.59/.001	--	--	--
11-76	Flora, IL STP (State Data)	1.6/.011	3.3/.022	--	--	--
11-76	Robinson, IL STP " "	2.0/.013	4.1/.027	--	--	--
11-76	Effingham, IL STP " "	2.6/.046	8.8/.154	--	--	--
11-76	Briggs Mfg. Co., Robinson, IL " "	1.8/.0007	<1	--	--	--
11-76	Mt. Carmel, IL STP " "	4.8/.050	21.4/.225	--	--	--
11-76	Carmi, IL STP " "	1.4/.008	3.7/.021	--	--	--
11-76	Lawrenceville, IL STP " "	1.0/.008	5.2/.043	--	--	--
11-76	Flintkote, Mt. Carmel, IL " "	550/2.75	8.8/.044	--	--	--
11-76	Texaco, Lawrenceville, IL " "	<1	1.3/.053	--	--	--
11-76	AMF, Olney, IL " "	1.2/.004	2.0/.007	--	--	--
11-76	Fairfield, IL STP " "	1.8/.009	2.7/.014	--	--	--
RR-76	Olney, IL STP " "	2.5/.047	<1	--	--	--

p. 5
of 6

6	7	8	9	10	11	12	13	
Naphthalene	Acenapthene	Ethyl Oleate	Dibenzofuran	Phenanthrene	Heptachlor	Tedion	(DCPA) Dacthal	
--	--	--	--	--	--	--	--	1
--	--	--	--	--	--	--	--	2
--	--	--	--	--	--	--	--	3
--	--	--	--	--	--	--	--	4
--	--	--	--	--	--	--	--	5
--	--	--	--	--	--	--	--	6
--	--	--	--	--	--	--	--	7
<50	--	--	--	--	--	--	--	8
--	--	--	--	--	--	--	--	9
--	<1	<.2	<1	1/.811	--	--	--	10
--	<1.5	<.2	<1	<1	--	--	--	11
--	<1	<.2	<1	<1	--	--	--	12
--	--	--	--	--	<.002	.036/.0001	.036/.0001	13
--	--	--	--	--	<.01	--	--	14
--	--	--	--	--	<.01	--	--	15
--	--	--	--	--	<.01	--	--	16
--	--	--	--	--	<.01	--	--	17
--	--	--	--	--	<.01	--	--	18
--	--	--	--	--	<.01	--	--	19
--	--	--	--	--	<.01	--	--	20
--	--	--	--	--	<.01	--	--	21
--	--	--	--	--	<.01	--	--	22
--	--	--	--	--	<.01	--	--	23
--	--	--	--	--	<.01	--	--	24
--	--	--	--	--	<.01	--	--	25
								26
								27
								28
								29
								30
								31
								32
								33
								34
								35
								36
								37
								38
								39
								40
								41
								42

21-a

4913 - Buff
8913 - Green
4213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

	Date	Discharger		1 Nitrofen	2 2,4,5 - T	3 Prolan	4 Bulan
1	4-22-75	Morgan Packing, Austin, IN		.057/.0001	.12/.0002	<.01	<.01
2	7-27-76	Spider Ck,downstream f/IngallsStone Bdf,IN		--	--	--	--
3	7-26-76	GM Central Foundry, Bedford, IN (001)		--	--	--	--
4	7-26-76	GM Central Foundry, Bedford, IN (002)		--	--	--	--
5	12-3-75	Newport Army Ammo, Newport, IN (001)		--	--	--	--
6	4-8-75	Crane NAD, Crane, IN(STP#4)(Avg. 2 grabs)		--	--	--	--
7	4-8-75	Crane NAD, Crane, IN (Plating Plant 005)		--	--	--	--
8	4-8-75	Crane NAD, Crane, IN (Boggs Ck. 006)		--	--	--	--
9	4-8-75	Crane NAD, Crane, IN (Rockeye Redwater)		--	--	--	--
10	4-12-73	Olin Corp., Covington, IN		--	--	--	--
11	11-76	Flora, IL STP	(State Data)	--	--	--	--
12	11-76	Robinson, IL STP	" "	--	--	--	--
13	11-76	Effingham, IL STP	" "	--	--	--	--
14	11-76	Briggs Manuf. Co.	" "	--	--	--	--
15	11-76	Mt. Carmel, IL STP	" "	--	--	--	--
16	11-76	Carmi, IL STP	" "	--	--	--	--
17	11-76	Lawrenceville, IL STP	" "	--	--	--	--
18	11-76	Flintkote, Mt.Carmel, IL	" "	--	--	--	--
19	11-76	Texaco, Lawrenceville, IL	" "	--	--	--	--
20	11-76	AMF, Olney, IL	" "	--	--	--	--
21	11-76	Fairfield, IL STP	" "	--	--	--	--
22	11-76	Olney, IL STP	" "	--	--	--	--
23	6-2-76	AMF, Olney, IL	" "	--	--	--	--
24	6-29-76	Anaconda Brass, Mattoon, IL	" "	--	--	--	--
25	7-14-76	Anaconda Brass, Mattoon, IL	" "	--	--	--	--
26	6-2-76	Briggs Manuf., Robinson, IL	" "	--	--	--	--
27	6-2-76	Carmi, IL STP	" "	--	--	--	--
28	6-28-76	Champaign-Urbana, IL (NE)	" "	--	--	--	--
29	6-8-76	Chanute AFB, IL	" "	--	--	--	--
30	7-15-76	Chanute AFB, IL	" "	--	--	--	--
31	6-25-76	Charleston, IL STP	" "	--	--	--	--
32	7-13-76	Charleston, IL STP	" "	--	--	--	--
33	6-28-76	Danville, IL STP	" "	--	--	--	--
34	6-2-76	Effingham, IL STP	" "	--	--	--	--
35	6-2-76	Fairfield, IL STP	" "	--	--	--	--
36	6-2-76	Flintkote, Mt. Carmel, IL	" "	--	--	--	--
37	6-2-76	Flora, IL STP	" "	--	--	--	--
38	6-28-76	G.E., Danville, IL	" "	--	--	--	--
39	6-29-76	G.E., Mattoon, IL	" "	--	--	--	--
40	7-14-76	G.E., Mattoon, IL	" "	--	--	--	--
41	6-28-76	GM Central Foundry, Danville, IL	" "	--	--	--	--
42							

5	6	7	8	9	10	11	12	13	
		Nitrated Hydrocarbons							
phenyls	Trinitrotoluene	RDX	HMX	Carbon Disulfide	Tetrahydrofuran	Isopropyl Alcohol	Total PCB	Total DDT	
--	--	--	--	--	--	--	--	--	1
<1	--	--	--	--	--	--	--	--	2
<1	--	--	--	--	--	--	--	--	3
/.018	--	--	--	--	--	--	--	--	4
--	None Detected	--	--	--	--	--	--	--	5
--	11/.003	<100	<100	--	--	--	--	--	6
--	<5	<100	<100	--	--	--	--	--	7
--	<5	<100	<100	--	--	--	--	--	8
--	22,000/1.49	250/.017	1750/.118	--	--	--	--	--	9
--	--	--	--	13,200/495	850/31.9	3900/146	--	--	10
--	--	--	--	--	--	--	<.1	.026/.0002	11
--	--	--	--	--	--	--	<.1	.046/.0003	12
--	--	--	--	--	--	--	<.1	.039/.0007	13
--	--	--	--	--	--	--	<.1	.020/.0000	14
--	--	--	--	--	--	--	.29/.0036	.023/.0002	15
--	--	--	--	--	--	--	<.1	.077/.0004	16
--	--	--	--	--	--	--	<.1	.21/.0018	17
--	--	--	--	--	--	--	12.8/.064	.016/.0001	18
--	--	--	--	--	--	--	<.1	<.01	19
--	--	--	--	--	--	--	<.1	<.01	20
--	--	--	--	--	--	--	<.1	.012/.0001	21
--	--	--	--	--	--	--	<.1	<.01	22
--	--	--	--	--	--	--	.3/.001	.014/.0000	23
--	--	--	--	--	--	--	<.1	<.01	24
--	--	--	--	--	--	--	<.2	<.01	25
--	--	--	--	--	--	--	<.2	<.01	26
--	--	--	--	--	--	--	<.2	.05/.0003	27
--	--	--	--	--	--	--	.58/.048	.017/.0014	28
--	--	--	--	--	--	--	.1/.0009	.038/.0003	29
--	--	--	--	--	--	--	.15/.0013	.04/.0004	30
--	--	--	--	--	--	--	.2/.0077	<.01	31
--	--	--	--	--	--	--	<.2	<.01	32
--	--	--	--	--	--	--	<.1	<.01	33
--	--	--	--	--	--	--	<.2	.02/.0004	34
--	--	--	--	--	--	--	<.2	<.1	35
--	--	--	--	--	--	--	.11/.0006	<.01	36
--	--	--	--	--	--	--	<.2	--	37
--	--	--	--	--	--	--	.56/.0006	<.04	38
--	--	--	--	--	--	--	<.2	<.01	39
--	--	--	--	--	--	--	.15/.0001	<.01	40
--	--	--	--	--	--	--	<.1	.012/.0008	41
									42

22a

4913 - Buff
8913 - Green
4213 - White

TABLE IV - ORGANICS DISCHARGED TO WABASH RIVER BASIN

Date	Discharger			1 Nitrofen	2 2,4,5 - T	3 Prolan	4 Bulan
6-2-76	Marathon Oil Refinery, RobinsonIL	(State	Data)	--	--	--	--
6-11-76	Marshall, IL East STP	"	"	--	--	--	--
7-8-76	Marshall, IL East STP	"	"	--	--	--	--
6-11-76	Marshall, IL West STP	"	"	--	--	--	--
7-8-76	Marshall, IL West STP	"	"	--	--	--	--
7-14-76	Mattoon, IL STP	"	"	--	--	--	--
6-29-76	Mattoon, IL STP	"	"	--	--	--	--
6-2-76	Mt.Carmel, IL STP	"	"	--	--	--	--
6-2-76	Olney, IL STP	"	"	--	--	--	--
6-11-76	Paris, IL North STP	"	"	--	--	--	--
7-8-76	Paris, IL North STP	"	"	--	--	--	--
6-11-76	Paris, IL South STP	"	"	--	--	--	--
7-8-76	Paris, IL South STP	"	"	--	--	--	--
6-8-76	Rantoul, IL East STP	"	"	--	--	--	--
7-15-76	Rantoul, IL East STP	"	"	--	--	--	--
6-2-76	Robinson, IL STP	"	"	--	--	--	--
6-2-76	Texaco, Lawrenceville, IL	"	"	--	--	--	--
6-25-76	Tuscola, IL North STP	"	"	--	--	--	--
6-25-76	Tuscola, IL South STP	"	"	--	--	--	--
6-8-76	Chanute AFB Test Cell	"	"	--	--	--	--
7-15-76	Chanute AFB Test Cell	"	"	--	--	--	--
6-28-76	GM Central Fountry, Danville, IL	"	"	--	--	--	--
6-28-76	GM Central Foundry, Danville, IL	"	"	--	--	--	--
6-2-76	Lawrenceville, IL STP	"	"	--	--	--	--

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		Nitrated Hydrocarbons							
5	6	7	8	9	10	11	12	13	
Terphenyls	Trinitro-toluene	RDX	HMX	Carbon Disulfide	Tetrahydro-furan	Isopropyl Alcohol	Total PCB	Total DDT	
--	--	--	--	--	--	--	<.2	.011/.0003	1
--	--	--	--	--	--	--	<.1	< .01	2
--	--	--	--	--	--	--	.17/.0003	< .01	3
--	--	--	--	--	--	--	<.1	< .01	4
--	--	--	--	--	--	--	.24/.0006	< .01	5
--	--	--	--	--	--	--	<.1	.015/.0004	6
--	--	--	--	--	--	--	<.1	< .01	7
--	--	--	--	--	--	--	.15/.0006	.037/.0004	8
--	--	--	--	--	--	--	<.2	< .01	9
--	--	--	--	--	--	--	<.1	.011/.0001	10
--	--	--	--	--	--	--	.2/.0013	.037/.0002	11
--	--	--	--	--	--	--	<.1	< .01	12
--	--	--	--	--	--	--	.15/.0012	.025/.0002	13
--	--	--	--	--	--	--	.10/.0013	.035/.0004	14
--	--	--	--	--	--	--	<.1	< .01	15
--	--	--	--	--	--	--	<.2	< .01	16
--	--	--	--	--	--	--	<.2	< .01	17
--	--	--	--	--	--	--	.22/.0006	<.045	18
--	--	--	--	--	--	--	.18/.0008	< .01	19
--	--	--	--	--	--	--	.1/.0000	< .01	20
--	--	--	--	--	--	--	.2/.0000	< .01	21
--	--	--	--	--	--	--	<.1	.016/.0000	22
--	--	--	--	--	--	--	.18/.0000	< .01	23
--	--	--	--	--	--	--	.4/.0022	< .01	24

23-a

TABLE V

SUMMARY OF
POINT SOURCE DISCHARGES OF TOXIC/HAZARDOUS ORGANICS

(1/4)

Rank	Organic Compound	Approximate Total Amount Discharged From Sources Tested (lb/da)	Source(s) Tested and Comments
1	Methyl amine	~675	Commercial solvents, Terre Haute, IN (only source tested)
2	Carbon disulfide	~495	Olin Corp., Covington, IN (only source tested)
3	Cyanide	299-377	Cyanides may or may not be related to discharge of organics. For example, 17.5-95.4 lb/da(company data showed 95.4 lb/da) being discharged from Eli Lilly, Clinton, IN, is known to be due to breakdown of nitriles, since no inorganic cyanides are used. Fourteen other Indiana and Illinois sources were found, the largest being Indianapolis Belmont STP (211 lb/da), and Indianapolis Southport STP (52 lb/da). (16 sources tested)
4	Isopropyl alcohol	~146	Olin Corp., Covington, IN (only source tested)
5	Picolines	~130	Indianapolis Belmont STP (found in 1972, not reconfirmed in 1974). (3 Indiana sources tested)
6	Tetrahydrofuran	~32	Olin Corp., Covington, IN (only source tested)
7	Phenolics	~30	Twenty-three Indiana and Illinois sources were found, the largest being Indianapolis Belmont STP (17 lb/da), and Texaco, Lawrenceville, IL (5 lb/da). (35 sources investigated)
8	Dibutyl phthalate	>28	Twenty-six Indiana and Illinois sources were found, the most significant being Commercial Solvents, Terre Haute, IN (25 lb/da), and Flintkote, Mt.Carmel, IL (2.75 lb/da). (27 sources tested)

TABLE V

SUMMARY OF POINT SOURCE DISCHARGES OF TOXIC/HAZARDOUS ORGANICS

(2/4)

Rank	Organic Compound	Approximate Total Amount Discharged From Sources Tested (lb/da)	Source(s) Tested and Comments
9	Aroclor 1242/1016	1.1-2.2	Four Indiana sources were found, the most significant being Bloomington, IN South STP (1.05-2.15 lb/da) (State data showed 2.15 lb/da) (See Table III for source of PCB) (22 Indiana sources tested)
10	Trinitrotoluene (TNT)	∿1.5	Crane Naval Ammunition Depot, Crane, IN (two Indiana sources tested)
11	Diethyl hexyl phthalate (DEHP)	>1.38	Twenty-one Indiana and Illinois sources were found, the most significant being Indianapolis Belmont STP (.49 lb/da) and Mount Carmel, IL STP(.23 lb/da). (28 sources tested)
12	Phenanthrene	∿0.81	Indianapolis Belmont STP (two Indiana sources tested)
13	Aroclor 1254	∿0.36	Three Indiana sources were found: Pfizer, Terre Haute; Kieffer Paper Mills, Brownstown; GM Central Foundry, Bedford (.22 lb/da) (22 Indiana sources tested)
14	Methylene Chloride	∿0.23	Eli Lilly, Clinton, IN (only source tested)
15	Total PCB	∿0.14	Fifteen Illinois sources were found (27 sources tested)
16	Nitrosamines	∿0.14	Eli Lilly, Lafayette, IN (only source tested)
17	Treflan (trifluralin)	∿0.138	Three Indiana sources were found, the most significant being Eli Lilly, Lafayette (.136 lb/da) (7 Indiana sources tested)
18	HMX (Nitrated hydrocarbon)	∿0.118	Crane Naval Ammunition Depot, Crane, IN (only source tested)

TABLE V

SUMMARY OF POINT SOURCE DISCHARGES OF TOXIC/HAZARDOUS ORGANICS

(3/4)

Rank	Organic Compound	Approximate Total Amount Discharged From Sources Tested (lb/da)	Source(s) Tested and Comments
19	Alpha-BHC	>0.070	Nine Indiana sources were found. (11 sources tested)
20	Dieldrin	>0.0228	Thirty-four Indiana and Illinois sources were found (43 sources tested).
21	o,p DDE	>0.019	Five Indiana sources were found. (14 sources tested)
22	Terphenyls	~0.018	GM Central Foundry, Bedford, IN (only source tested)
23	RDX (Nitrated hydrocarbon)	~0.017	Crane Naval Ammunition Depot, Crane, IN (only source tested)
24	p,p' DDE	>0.015	Six Indiana sources were found. (14 sources tested)
25	Total DDT	~0.0094	Eighteen Illinois sources were found (27 Illinois sources tested)
26	Aroclor 1248	~0.007	Three Indiana sources were found: Weston Paper, Terre Haute; Commercial Solvents, Terre Haute; 3M, Hartford City (22 Indiana sources tested)
27	Heptachlor epoxide	>0.0061	Twenty-six Illinois and Indiana sources were found (42 sources tested)
28	o,p DDT	>0.004	Six Indiana sources found.
	p,p' DDT	>0.004	Seven Indiana sources found. (14 sources tested)

TABLE V

SUMMARY OF POINT SOURCE DISCHARGES OF TOXIC/HAZARDOUS ORGANICS

(4/4)

Rank	Organic Compound	Approximate Total Amount Discharged From Sources Tested (lb/da)	Source(s) Tested and Comments
29	Aroclor 1221	~0.004	Pfizer, Inc., Terre Haute, IN (22 Indiana sources tested)
30	Aldrin	>0.003	Nine Indiana sources found. (14 sources tested)
31	Heptachlor	>0.0022	Eight Indiana sources found (24 Illinois and Indiana sources tested)
32	o,p DDD	>0.0015	Three Indiana sources found. (14 sources tested)
33	p,p' DDD	>0.0008	Three Indiana sources found. (14 sources tested)
34	2,4,5-T	~0.0002	Morgan Packing, Austin, IN (only source tested)
35	Lindane	>0.0001	Six Indiana sources were found. (11 sources tested)
36	Tedion Nitrofen Dacthal	~0.0001 ~0.0001 ~0.0001	Morgan Packing, Austin, IN (only source tested)

NOTE: Compounds for which the amount discharged shown above is very small may not represent a hazard. Toxicity and/or safe environmental levels of most of the compounds have not been determined.

All of the above compounds occur elsewhere in the United States at different concentrations in various sources and waters.

In addition to the compounds shown in Table V, the following organics were detected in discharges to the basin but were not quantified in terms of pounds per day:

Compound	Number of Sources Found (Indiana)
Beta-BHC	1
Gamma-Chlordane	6
2,4-D Isopropylester	1
Endrin	2
Farsenol	1
Methoxychlor	1

In addition to the above toxic/hazardous organic compounds detected in direct discharges, the following toxic/hazardous chemicals were not detected in any samples collected of direct discharges to the basin (Note that Mirex was detected in a discharge to the Indianapolis sewerage system; see Table III):

Compound Not Detected	Number of Sources Tested (Indiana)
Hexachlorobenzene	6
Zytron	4
Isodrin	3
Mirex	6
Endosulfan I	3
Endosulfan II	6
Chlorobenzilate	2
Phenkapton	Eli Lilly, Clinton only
EPN	"
Azinphos Methyl	"
Azinphos Ethyl	"
Phosalone	"
Coumaphos	"
Phorate	"
Diazinon	"
Dyfonate	"
Ronnel	"
Dursban	"
Methyl Parathion	"
Ethyl Parathion	"
Malathion	"
DEF	"
Ethion	"
DNBP	"
Carbophenothion	"
Aroclor 1260	22

Compound Not Detected	Number of Sources Tested (Indiana)
Stearic Acid	4
Napthalene	Uniroyal, Indianapolis only
Acenaphthene	3
Ethyl oleate	3
Dibenzofuran	3
Prolan	Morgan Packing, Austin only
Bulan	"

Ambient River and Stream Data

Existing ambient river and stream data are presented in Appendix C. These data clearly show PCB contamination downstream of Bloomington, Indiana and, more importantly, according to data generated in May and June of 1974, the presence of the following organics in the Wabash River at New Harmony (below most point source dischargers):

Compound	Concentration (µg/l)
Aroclor 1254	0.212
Lindane	0.008
Heptachlor epoxide	0.016
Dieldrin	0.009
Gamma-Chlordane	0.008
o,p DDT	0.003
p,p' DDT	0.015
o,p DDD	0.006
p,p' DDD	0.005
o,p DDE	0.005
p,p' DDE	0.027
Methoxychlor	0.052
Dibutyl phthalate	13.52
Diethyl hexyl phthalate	4.38
Alpha BHC	0.006

Tests at the same location in January 1977, revealed the presence of 0.4 µg/l Aroclor 1248, and non-detectable amounts of other Aroclors.

The ambient river data also show considerable organic contamination of tributaries to the Wabash such as the White River, Tippecanoe River, Mississinewa River, and Vermilion River. More ambient sampling may be warranted depending on the outcome of additional point source sampling.

Non-Point Source Organics Pollution

Non-point sources of toxic/hazardous organic chemicals would be mainly runoff from farm applications of herbicides and pesticides. Another source would be runoff carrying residues of chemicals used for extermination of weeds and insects by local entities. Since most applications are done in spring, an assessment of the severity of this problem would entail ambient river sampling at selected sites at two different times of year, one of which should be immediately after spring farm applications of herbicides/pesticides. Existing ambient data do not lend themselves to an assessment of the non-point source problem.

Carbon Filter Data

Carbon filters for collection of ambient river organics samples were placed at three locations (Lafayette, Terre Haute, and Mount Carmel) on the Wabash River and one location on the White River in May 1976. These samples are currently in analysis phase at Central Regional Laboratory. Resulting data will be presented when available. Preliminary partial results indicate the presence of multifarious organics.

Fish Data

Some fish have been collected and analyzed for various organics in the Wabash River Basin, but many remain to be analyzed. The presentation of fish data relating to the presence of toxic/hazardous organics in the Wabash River Basin will be deferred until such time as all data are available.

Sludge and Sediment Data

Studies performed by the ISBH and the USEPA have revealed PCB contamination of Indiana municipal wastewater treatment plant sludges from 16 "major" sources in the Wabash River Basin, as follows:

Bloomington, South Plant
Indianapolis, Belmont Plant
Kokomo
Crawfordsville
Lafayette
Huntington
Columbus
New Castle
Vincennes
Anderson
Muncie
Frankfort
Marion
Terre Haute
Warsaw
Bedford

Whereas the source of the PCBs in Bloomington is known to be Westinghouse Corp., the remainder of the communities should be thoroughly evaluated to determine possible sources of PCBs and other toxic/hazardous organics getting into the sewerage systems. It would seem worthwhile to continue such a sludge analysis program for all "major" municipal dischargers in the basin.

Sediments collected from streams downstream of the landfill sites used by known PCB dischargers have revealed attendant PCB contamination. Such studies have been performed by the ISBH and the USEPA in streams below the Bloomington, Indiana South STP; below GM Central Foundry, Bedford, Indiana; and at landfill sites used to dispose of PCB-containing material from Westinghouse, Bloomington, Indiana; and GM Central Foundry, Bedford, Indiana.

Further stream sediment work should be confined to known significant sources of toxic/hazardous organics.

Public Drinking Water Supply Data

Public water supplies which utilize surface water as source of supply in the Wabash River Basin are presented in Appendix D. Organics occurring in two of these, Mount Carmel, Illinois and Terre Haute, Indiana, have been investigated as portions of reports already discussed (2, 8). Specifically, neither picolines nor nitrosamines were found in the water supply intake at Mount Carmel, Illinois; and nitrosamines were not detected in the intake of the water supply at Terre Haute, Indiana.

Data from USEPA and ISBH studies of water supply contamination with PCB in waterways below Bloomington, Indiana are presented in Appendix C. As shown, the data confirmed the presence of PCBs (Aroclors 1242/1016 and 1248) in the raw waters at the Bedford, Indiana, Salt Creek and East Fork White River filtration plants. PCBs were not confirmed in the treated waters from these filtration plants.

As part of a national survey of organics in drinking water supplies, an extensive investigation of organics in water supplies throughout Region V was undertaken by the USEPA and presented in a report dated April 1975 (9). Excerpts from this report are presented in Appendix E. Results pertaining to the Wabash River Basin are summarized below. Various chlorinated toxic/hazardous organics (for specifics see Appendix E) were found in either the raw or finished waters (or both) at the following locations:

Newton, Illinois
Lafayette, Indiana
Terre Haute, Indiana
Logansport, Indiana
Danville, Illinois
Indianapolis, Indiana
Bloomington, Indiana
Kokomo, Indiana
Muncie, Indiana
Fairfield, Illinois
Mount Carmel, Illinois
Bedford, Indiana

The above results showed that chlorination of the water increased the occurence of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Other chlorinated compounds found included carbon tetrachloride, methylene chloride, and 1,2-dichloroethane. All of the above are surface supplies with the exception of Lafayette, Indiana.

As part of the same study (9), selected water supplies were tested for the following toxic/hazardous organics:

- Diethylhexylphthalate
- DDT
- Dieldrin
- Treflan
- Hexachlorobenzene
- Aldrin
- Zytron
- Lindane
- 2,4-D Isopropylester
- Gamma Chlordane

One or more of these were detected in the following public water supplies in the Wabash River Basin (either raw or finished water or both):

Bedford, Indiana
Indianapolis, Indiana
Kokomo, Indiana
Lafayette, Indiana
Logansport, Indiana
Mount Carmel, Illinois

All of the above are surface water supplies with the exception of Lafayette, Indiana. It should be stressed that the concentrations of the latter compounds were very low (nanograms per liter range).

Inasmuch as the foregoing study revealed organic chemical contamination at selected water supplies in the Wabash River Basin, it is recommended that all of the surface water supplies (see Appendix D) be analyzed for toxic/hazardous organic chemicals.

Conclusions and Recommendations

From this Phase I investigation of toxic/hazardous organic chemicals in the Wabash River Basin, the following conclusions and recommendations are drawn:

1. Those "major" municipal and industrial point source dischargers which have been identified in this report, and have not been tested for organics, should be sampled and so tested. The compounds to be analyzed should include, as a minimum, the compounds detected in the Wabash River at New Harmony, Indiana, and the compounds detected in downstream water supplies as identified in this report.

2. Those "minor" municipal point source dischargers which have been identified in this report, and have not been tested for organics, should be sampled and so tested on a case by case basis as resources allow.

3. Depending on the results from items number 1 and 2 above, those "minor" industrial point source dischargers which have been identified in this report, and which are located in communities showing organics being discharged, should be sampled and so tested as resources allow.

4. Some of the "minor" industrial dischargers identified in this report, which have not been tested for organics, probably discharge all of their wastewaters directly to the Wabash River Basin without going through a municipal wastewater treatment plant. These dischargers remain to be identified.

5. The specific organic compounds identified in this report as being discharged by point sources (both municipal and industrial) should be confirmed by resampling if necessary and controlled through the NPDES permit limitation/Toxic Substance Act process. This is particularly true where one or two significant sources have been identified.

6. Limited ambient river and stream organics data has revealed considerable organics contamination throughout the basin, and, in particular, in the Wabash River at New Harmony, Indiana, a location below most point source dischargers. As the values at New Harmony are quite high, they should be confirmed by resampling. A more complete picture of the extent of organic contamination in the Wabash River Basin will be available when the carbon filter analyses are complete (Wabash and White Rivers). Partial preliminary results of carbon filter analyses indicate extensive organics contamination.

7. Whereas some fish analyses have been completed, fish data have been excluded from this report and will be deferred until all data are received.

8. Public drinking water supplies throughout the basin have been found to contain various organics in varying concentrations. Organics were found in eleven surface supplies and one well supply (either raw or finished water or both). Chlorination of water was found to increase the occurrence of certain chlorinated hydrocarbons in the supplies tested. It is recommended that the water supplies identified be periodically monitored for toxic/hazardous organics until such time as the sources of the organics can be identified and controlled. Additionally, all surface water supplies in the Wabash River Basin not yet checked should be analyzed for toxic/hazardous organics. Also, the policies of chlorination at each of these supplies should be carefully reviewed.

9. As the policy of analyzing municipal wastewater treatment plant sludges for PCBs has revealed contamination at 16 "major" sources in Indiana, it is recommended the policy be extended for

all "major" municipal dischargers in the Wabash River Basin. Those municipalities with PCB-contaminated sludges should be throughly evaluated to determine possible sources of PCBs and other toxic/ hazardous organics being discharged to the sewerage systems.

10. An assessment of the severity of the non-point source toxic/ hazardous organic chemical problem will entail ambient river sampling at selected sites at two different times of year, one of which should be immediately after spring farm applications of herbicides and/or pesticides. Existing ambient data do not lend themselves to an assessment of the non-point source problem.

11. It is recommended that further stream sediment sampling be confined to known significant sources of toxic/hazardous organics.

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APPENDIX A

EXCERPTS FROM "ORGANIC CHEMICALS IN THE WABASH AND OHIO RIVER BASINS, MAY - NOVEMBER 1974" REPORT

Discussion of Results

During the discussion of pesticide data, numbers in parentheses are frequency of occurrence given as percent.

1. Mississinew River

A. PCBs - six samples were collected in the Mississinewa River Basin. Aroclor 1248 and 1254 were found in one and three of the samples, respectively. Aroclor 1248 (0.4 µg/l) was found in 3M Corporation 001 effluent, and Aroclor 1254 in the Mississinewa River between Matthews and below Marion, Indiana.

B. Pesticides - the most common occurring pesticides were heptachlor (83), aldrin (100), o,p'-DDT (83), p,p'-DDT (83), and p,p'-DDE (50).

C. Plasticizers - Di-N-butyl phthalate occurred in every sample. Di(2-ethylhexyl) phthalate (28 µg/l) was found in 3M Corporation's 002 effluent, Hartford City, Indiana. This was the highest concentration found during the survey. The data indicates that these plasticizers are introduced into the Mississinewa throughout the reach studied from below Marion, Indiana to the headwaters.

D. Selected organics - no samples were collected for selected organics analysis.

2. White River

A. PCBs - nine PCBs samples were collected from the White River and point sources in the Indianapolis area. Aroclor 1254 was found once near the mouth of the White River. No other PCBs were detected. This is a large river basin and due to the limited amount of sampling the extent of PCBs cannot be ascertained.

B. Pesticides - eight samples were collected for chlorinated pesticides from the White River Basin. Seven were from the Indianapolis area. The most common occurring pesticides were: lindane (57), aldrin (50), chlordane (57), o,p' DDT (57), p,p' DDT (57), o,p' DDE (57), p,p' DDE (71), and Alpha BHC (71).

C. Selected organics - samples collected during 1971-72 indicated picolines (coal tar derivatives) were entering the West Fork White River via the Indianapolis sewage treatment plant. Picolines or other coal tar derivatives were not detected in the samples collected from the Indianapolis sewage treatment plant's effluent during August 1974, nor the White River at Hazelton (near mouth) in May and June 1974. However, other compounds that are coal tar derivatives or substituted derivatives were found in the influent of the Belmont and Southport STPs. These were fluoranthene, phenonthrene or anthracene, and acenaphthene. Dibenzofuran, an heterocyclic organic compound sometimes used as an insecticide was also found. Stearic acid and ethyl oleate, both common to animal fats and oils, used in the preparation of proprietary medicinal compounds, were detected in samples collected from the Indianapolis STPs.

Although coal tar derivatives were not detected in the STP effluents, additional monitoring should be considered because coal tar derivatives are known to cause tainting of fish flesh, and taste and odor problems in drinking water.

3. Mainstem Wabash River

A. PCBs - fifty-five samples were collected for PCBs from the mainstem Wabash River tributaries, industries and municipalities between mile points 313.25 and 43.1. Four samples from the Wabash River contained Aroclor 1254. No other PCBs were detected in the river or tributaries. Aroclor 1248 was measured at Weston Paper's 001 and 004, Aroclor 1242 at Eli Lilly 004, and Terre Haute STP, and Aroclor 1254 at Rostone Corporation, Lafayette, Indiana and Pfizer's 001, 002 and 003 effluents.

B. Pesticides - forty samples were analyzed for pesticides. The frequency of occurrences as percent are given below:

Dieldrin	76	p,p' DDT	39
Heptachlor	72	Treflan	36
Aldrin	72	p,p' DDE	30
BHC	64	o,p' DDE	21
o,p' DDT	53	o,p' DDD	9
Lindane	52	Meth-oxychlor	5
Heptochlor-epioxide	42	p,p' DDD	3
Chlordane	39	Endrin	0

All pesticide concentrations except one (heptochlorepioxide) increased between Wabash River mile points 313.25 and 193.50. This would be expected as the sediments containing pesticides are scoured from the streambeds and are transported downstream.

C. Plasticizers - Di-N-butyl phthalate and Di-(2-ethy hexyl) phthalate were found in 95 and 64 percent of the 37 samples collected. The river concentrations do not change significantly in the reach studied. Some known sources of the plasticizers are as follows:

Upper Wabash River (above mile point 313.25)
Rostone Corporation 001, Lafayette, Indiana

Vermillion River, Illinois and Indiana
Commercial Solvents 001 and 003, Terre Haute, Indiana
Weston Paper and Manufacturing, Terre Haute, Indiana
Terre Haute STP, Terre Haute, Indiana
White River, Indiana

Commercial Solvents and Rostone Corporation had the highest concentrations of any sources listed for Di-N-butyl phthalate. Commercial Solvents is discharging another plasticizer, tri-n-butyl phosphate. Plasticizer concentrations in μg/l are listed in Table VII.

TABLE VII

PLASTICIZER DATA FOR ROSTONE CORPORATION AND COMMERCIAL SOLVENTS

Location	Date 1974	Time	Di-N-butyl phthalate (μg/l)	Tri-N-butyl phosphate (μg/l)
Rostone Corp.	8-8	1430	25	--
Commercial Solvents 001	8-8	1105	20	20
Commercial Solvents 001	8-9	0810	50	20
Commercial Solvents 002	8-8	1130	10	10
Commercial Solvents 002	8-9	0820	10	10
Commercial Solvents 003	8-8	1140	2310	200
Commercial Solvents 003	8-9	0827	210	250
Commercial Solvents 004	8-9	1155	10	10

D. Organics - known dischargers of various organic compounds are listed below:

Industry	Location	Synthetic Organic Compounds Found in Effluent
Eli Lilly	Lafayette, IN	Treflan, phenolics, tetrahydrofuran, methanol
Olin Corp.	Covington, IN	Carbon disulfide tetrahydrofuran, Isopropyl alcohol
Commercial Solvents	Terre Haute, IN	Di-n-butyl phthalate Tri-n-butyl phosphate Methanol, Dimethylamine

Industry	Location	Synthetic Organic Compounds Found in Effluent
Pfizer	Terre Haute, IN	Organics - none detected (all less than 0.05 mg/l)
Velsicol	Marshall, IL	Indene Acetophenane Trimethylhexyl alcohol unknown chlorinated hydrocarbons and volatile organics
Western Tar	Terre Haute, IN	Phenolics Pentachlorophenol
Weston Paper Co.	Terre Haute, IN	Phenolics

There are also numerous oil spills from pipelines and pumping operations within the basin which introduce aliphatic and aromatic hydrocarbons that may be broken down into short chained hydrocarbons and be chlorinated at water intakes downstream.

Mount Carmel, Indiana, population 7,950 has a drinking water intake from the Wabash River downstream from all the above mentioned sources of synthetic organics. Mount Carmel's intake and treated water should be monitored for synthetic organics, pesticides, PCBs, and plasticizers.

(1/1)

APPENDIX B

CATEGORIES OF INDUSTRIES USED IN SELECTING COMMUNITIES AS POTENTIAL DISCHARGERS OF TOXIC/HAZARDOUS ORGANIC CHEMICALS

Aluminum
Capacitors
Cellophane
Chemicals
Cleaning Compounds
Coke
Creosoting
Disinfectants
Dyes
Electrical Equipment
Explosives and Ordnance
Foundries (Ferrous and Nonferrous)
Insecticides
Oils
Paints and Varnishes
Paper Mills and Products
Pharmaceuticals
Plastics
Railway (Yards and Equipment)
Refineries
Resins
Rubber
Steel
Transformers
Wood Preserving

APPENDIX C
WABASH RIVER BASIN TOXIC/HAZARDOUS ORGANICS AMBIENT RIVER DATA, POINT SOURCE DATA, AND PUBLIC WATER SUPPLY DATA

TABLE VI

Nitrosamine Levels In Wabash River Waters And Sediments, And Water Treatment Plants, December 16-17, 1976

Data Source	Nitrosamines (µg/l)* DMN	DPN	EBN	Total
12/16-17/76, Wabash River Above Eli Lilly				
EPA	ND	ND	ND	ND
Lilly	ND	ND	ND	ND
12/16-17/76, Wabash River Below Eli Lilly				
EPA		0.03		0.03
Lilly	ND	0.08	ND	0.08
12/16-17/76, Wabash River Sediments Above Eli Lilly**				
EPA	ND	ND	ND	ND
12/16-17/76, Wabash River Sediments Below Eli Lilly**				
EPA	ND	ND	ND	ND
12/16-17/76, Mt. Carmel, Ill. WTP Intake				
EPA	ND	ND	ND	ND
12/16-17/76, Mt. Carmel, Ill. WTP Finished Waters				
EPA	ND	ND	ND	ND
12/16-17/76, Terre Haute, Ind. WTP Intake				
EPA	ND	ND	ND	ND
12/16-17/76, Terre Haute, Ind. WTP Finished Waters				
EPA				***

* DMN = dimethyl nitrosamine; DPN = dipropyl nitrosamine; EBN = ethyl butyl nitrosamine; ND = nitrosamines not detectable.

** µg/kg

*** Unexplained compounds found in Terre Haute finished waters. Results are premature. Resampling is underway and analyses are continuing.

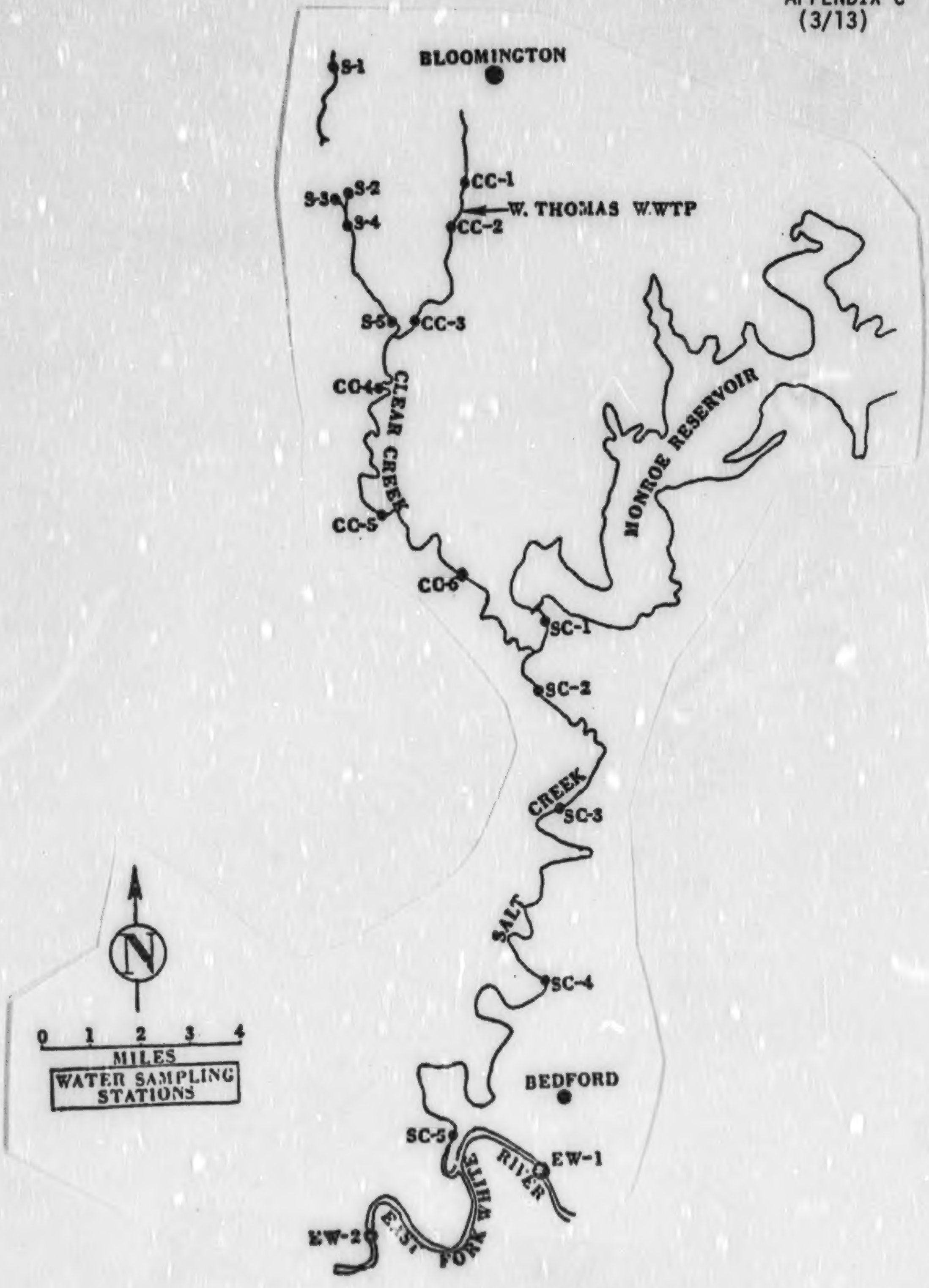

BLOOMINGTON
S-1
CC-1
S-3
S-2
W. THOMAS WWTP
S-4
CC-2
S-5
CC-3
CC-4
CLEAR CREEK
MONROE RESERVOIR
CC-5
CC-6
SC-1
SC-2
CREEK
SC-3
SALT
SC-4
N
0 1 2 3 4
MILES
WATER SAMPLING STATIONS
BEDFORD
SC-5
EW-1
WHITE RIVER
EW-2
EAST FORK

Table 1. Laboratory results from discharges and stream stations in the Clear Creek drainage basin in Monroe County, Indiana.

Station	Location	Date	Type of Sample *	Discharge MGD	PCB's ug/l	Pounds/day
CC-1	Clear Creek at Country Club Road (upstream)	3/11-12/76	C		0.811 as Aroclor 1016	
	Westinghouse Main Sewer	3/11-12/76	C	0.125-0.135	2630.0 as Aroclor 1016	2.74-2.96
	Winston Thomas WWTP	3/11-12/76	C	7.5		
	Influent				124. as Aroclor 1016	7.85
	Effluent				24.9 as Aroclor 1016	2.15
CC-2	Clear Creek at Rhorer Road (Gordon Pike) (downstream)	3/11-12/76	C		41.2 as Aroclor 1016	
CC-3	Clear Creek at Dillman Road	3/11/76	G		3.2 as Aroclor 1016	
CC-4	Clear Creek at Fluck Mill Road	3/11/75	G		2.1 as Aroclor 1016	
CC-5	Clear Creek at Ketcham Road	3/11/76	G		0.86 as Aroclor 1016	
CC-6	Clear Creek at Old S.R. 37	3/11/76	G		0.86 as Aroclor 1016	
S-1	Sinking Creek at S.R. 48	12/15/75 1/22/75 3/11/76	G G G		<0.10 as Aroclor 1254 0.373 as Aroclor 1248 0.114 as Aroclor 1248	
S-2	Shirley Springs	12/15/75 3/11/76	G G		<0.10 as Aroclor 1254 <0.10 as Aroclor 1248	
S-3	Leonard Springs	3/11/76	G		<0.10 as Aroclor 1248	
S-4	Leonard Springs Branch at old dam site	12/15/75	G		<0.10 as Aroclor 1254	
S-5	Leonard Springs Branch at Victor Pike	3/11/76	G		<0.10 as Aroclor 1248	

* G = grab sample: C = 24-hour composite of 12 equal-volume aliquots.

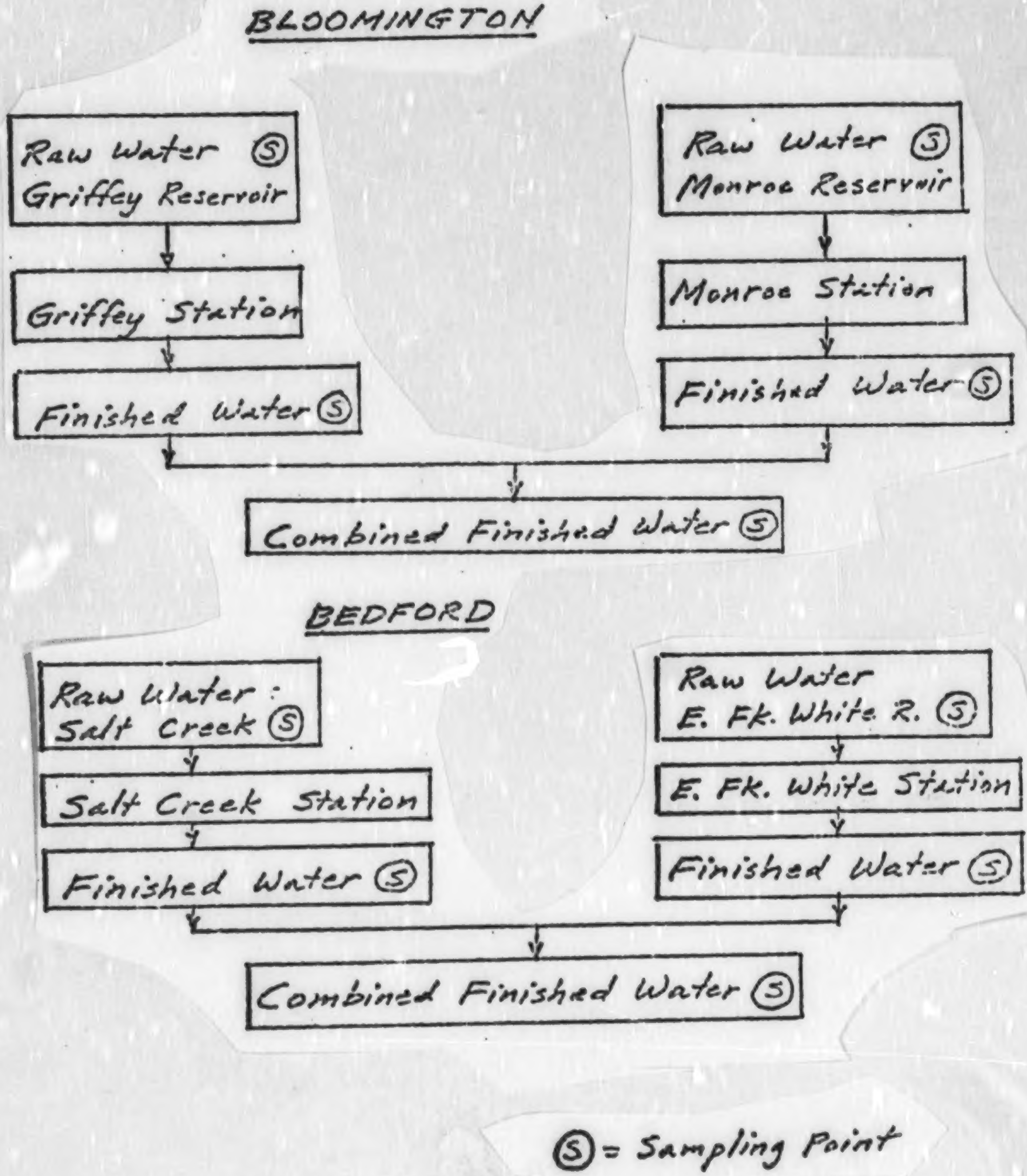
Table 2. Laboratory results from Salt Creek and East Fork White River in Monroe and Lawrence Counties, Indiana.

Station	Location	Date	Type of Sample *	PCB's ug/l
SC-1	Salt Creek just below Monroe Reservoir	3/11/76	G	<0.10 as Aroclor 1248
SC-2	Salt Creek at Guthrie	3/11/76	G	<0.10 as Aroclor 1248
SC-3	Salt Creek at Logan	3/11/76	G	<0.10 as Aroclor 1248
SC-4	Salt Creek at Oolitic	3/11/76	G	0.09 as Aroclor 1248
SC-5	Salt Creek at S.R. 450	3/11/76	G	<0.10 as Aroclor 1248
EW-1	East Fork White River at S.R. 37	3/11/76	G	<0.10 as Aroclor 1016
EW-2	East Fork White River at Stumphole Bridge	3/11/76	G	<0.10 as Aroclor 1016
	Bedford White River Filtration Plant - Raw water	3/11/76	G	0.085 as Aroclor 1016
	Bedford Salt Creek Filtration Plant - Raw water	3/3/76	G	0.102 as Aroclor 1248

* G = grab sample

FIGURE 1

WATER SUPPLY SAMPLING
BLOOMINGTON AND BEDFORD, IN
USEPA – INDO
MARCH 3, 1976


BLOOMINGTON
Raw Water Ⓢ Griffey Reservoir
Griffey Station
Finished Water Ⓢ
Raw Water Ⓢ Monroe Reservoir
Monroe Station
Finished Water Ⓢ
Combined Finished Water Ⓢ
BEDFORD
Raw Water : Salt Creek Ⓢ
Salt Creek Station
Finished Water Ⓢ
Raw Water E. Fk. White R. Ⓢ
E. Fk. White Station
Finished Water Ⓢ
Combined Finished Water Ⓢ
Ⓢ = Sampling Point

WATER TREATMENT
PLANT SURVEYS
JANUARY AND MARCH 1976
USEPA - INDO

Page 1 of 2

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		Salt Creek Station Bedford - Source	Salt Creek Station Bedford - Source	Salt Creek Station Bedford - Treated	Salt Creek Station Bedford - Treated	Salt Creek Station Bedford - Sludge	Salt Creek Station Bedford - Backwash	E. Fk. White R. Station Bedford - Source	E. Fk. White R. Station Bedford - Treated	Bedford Distribution System - Combined	
Parameter		1/20	3/3	1/20	3/3	1/20	1/20	3/3	3/3	3/3	
Log No.		2325	2464	2324	2465	2331	2334	2466	2467	2468	
Flow	mgd	0.2*	0.20	0.2*	0.20	N.D.	N.D.	2.72	2.72	2.92	
Aroclor 1016	ug/l	1.0	0.25	**0.5	<0.1	1.5	<0.1	<0.1	<0.1	<0.1	
	lb/da	.0017	.0004	.0008							
Aroclor 1248	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	3.4	<0.1	<0.1	<0.1	
	lb/da										
Aroclor 1254	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	lb/da										
Aroclor 1260	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	lb/da										

*Estimated flow: flow in Salt Creek was 1203 mgd

**Average of two values (0.2 and 0.8 ug/l)

WATER TREATMENT PLANT SURVEYS JANUARY AND MARCH 1976 USEPA - INDO

		M. Griffey Station, Bloomington - Source	M. Griffey Station Bloomington - Treated	Monroe Station Bloomington - Source	Monroe Station Bloomington - Treated	Bloomington Distrib. System - Combined	Westinghouse Plant Intake				
Parameter		3/3	3/3	3/3	3/3	3/3	1/21				
Log No.		2469	2470	2471	2472	2473	2323				
Flow	mgd	1.2	1.2	10.05	10.05	11.25	0.261				
Aroclor 1016	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	0.2				
	lb/da						.0004				
Aroclor 1248	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	< 0.1				
	lb/da										
Aroclor 1254	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	< 0.1				
	lb/da										
Aroclor 1260	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	< 0.1				
	lb/da										

ENVIRONMENTAL PROTECTION AGENCY, INDIANA DISTRICT OFFICE
EVANSVILLE, INDIANA

TABLE I

CHEMICAL DATA FOR MISSISSINEWA

All data reported as micrograms per liter

INDO Log No.	Location	Mile Point	Date 1974 Time	AROCHLORS 1221	1232	1242	1248	1254	1260	Lindane	HCHLR	ALDRIN	HCHLR EP	Dieldrin	Endrin	Chlordane	o,p'-DDT	p,p'-DDT	o,p'-DDD	p,p'-DDD	o,p'-DDE	p,p'-DDE	Methxyclr	Di-n-butyl phthalate	Di-(2-ethyl hexyl) Phthalate	Alpha BHC
2153	Mississinewa River @ Hwy 15 below Marion IN	455.0 30.61	7/24 1045	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<.002	.004	.007	<.002	<.001	<.001	<.002	.031	.035	<.002	<.002	<.002	<.002	<.004	12	<0.5	<.002
2154	Mississinewa River @ Highland Ave in Marion	34.91	7/23 1025	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<.002	.004	.007	<.002	<.001	<.001	<.002	.038	.039	<.002	.004	<.002	.038	<.004	11	<0.5	<.00
2156	Mississinewa River @ IND-2	53.91	7/24 1310	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	<.002	.005	.006	<.002	<.001	<.001	<.002	.027	.028	<.002	<.002	.036	.004	<.004	24	<0.5	<.00
2082	Big Lick Creek below Hartford City	0.90	7/18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.010	.010	<.002	<.001	<.001	<.002	.025	.097	<.002	<.002	<.002	<.002	<.004	6.2	<0.5	.03
2094	Cooling H2O 3-M Corp. Covington 001	6.20	7/24 0220	<0.1	--	<0.1	0.4	<0.1	<0.1	<.002	.036	.007	<.002	<.004	<.004	<.002	.023	.048	<.002	<.002	<.002	<.002	<.004	0.5	0.5	.00
2096	3 M Corp. Process 002	" "	7/24 0155	<0.1	--	<0.1	<0.1	<0.1	<0.1	<.002	<.002	.013	.009	<.004	<.004	<.002	<.002	<.002	<.002	<.002	<.002	.035	0.11	1.4	28	<.00

APPENDIX C
(9/13)

ENVIRONMENTAL PROTECTION AGENCY, INDIANA DISTRICT OFFICE
EVANSVILLE, INDIANA

TABLE II

CHEMICAL DATA FOR THE WHITE RIVER

All data are reported in micrograms per liter

INDO Log No	Location	Mile Point	Date 1974 Time	1221	1242	AROCHLORS 1248	1254	1260	1232	Lindane	HCHLR	ALDRIN	HCHLR-EP	Dieldrin	Endrin	Chlordane	o,p'-DDT	p,p'-DDT	o,p'-DDD	p,p'-DDD	o,p'-DDE	p,p'-DDE	Methxyclr	Di-N-butyl phthalate	Di-(2-ethyl hexyl) phthalate	Alpha BHC
2207	White R. @ Hazelton	4.30	5/23 0925	<.001	<.001	<.001	.212	<.001	<.001	.011	<.001	<.001	<.001	<.001	<.001	.008	.002	.001	.007	.003	.010	.051	.004	3.97	1.24	.012
2252	" " "	"	6/20 0950	<.005	<.005	<.005	<.005	<.005	<.005	<.001	<.001	<.001	.003	.004	<.001	.008	.001	.016	.006	<.001	<.001	.016	<.002	14.5	5.3	<.001
2750	Chrysler Inf.		3/21 1300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5																	
2752	" " "		8/22 0902																							
2710	" " " Eff. 001		8/21 1225	<0.5	--	<0.5	<0.5	<0.5	<0.5																	
2742	Indianapolis STP - Belmont Plant	228.5	8/21 0935	<0.5		<0.5	<0.5	<0.5	<0.5	<.002	<.002	<.002	<.002	.006	<.001	<.002	<.002	<.002	<.002	<.002	.020	.015	<.01	1.1	0.6	.068
2744	Indianapolis STP - Southport 001	222.4	8/20 1407																							
2748	" " " 002	" "	8/21 1030	<0.5		<0.5	<0.5	<0.5	<0.5	.021	<.002	.013	<.002	<.001	<.001	<.002	<.002	<.002	<.002	<.002	.006	.014	<.01	6.3	0.9	.091
2592	" " " 002	" "	8/21 1020	<0.5		<0.5	<0.5	<0.5	<0.5	.010	.013	.022	.005	<.002	<.002	<.002	.024	.024	.009	.005	.026	.017	<.01	5.0	0.5	.006
2725	Beech Grove STP		8/22 1345	<0.5		<0.5	<0.5	<0.5	<0.5	<.002	<.002	.020	.021	.038	<.002	.043	<.002	<.002	<.002	<.002	<.002	<.002	<.01	4.0	2.6	<.002
2731	Greenwood STP No. 1		9/12	--	--	--	--	--	--	.042	<.002	<.005	<.002	.022	<.002	.021	--	--	<.002	<.002	--	--	<0.1	5.5	2.4	.063
2736	" " " No. 2		9/12 0945	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	.008	.010	--	<.002	<.002	--	.011	.036	--	--	<.002	<.002	--	3.1	0.6	--

APPENDIX C
(10/13)

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ENVIRONMENTAL PROTECTION AGENCY, INDIANA DISTRICT OFFICE
EVANSVILLE, INDIANA

TABLE III

CHEMICAL DATA FOR THE WABASH RIVER

All data are reported in micrograms per liter

INDO Log No.	Location	Mile Point	Date 1974 Time		AROCHLORS 1221	1242	1248	1254	1260	Lindane	HCHLR	ALDRIN	HCHLR-EP	Dieldrin	Endrin	Chlordane	o,p'-DDT	p,p'-DDT	o,p'-DDD	p,p'-DDD	o,p'-DDE	p,p'-DDE	Methxyclr	Di-n-butyl Phthalate	Di-(2-ethyl hexyl) Phthalate	Alpha BHC
2415	Wabash R. @ Americus Br	313.25	7/31 0935		<0.1	<0.1	<0.1	0.4	<0.1	<.002	<.002	<.002	.010	<.001	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	15	2.5	<.002
2416	Tippecanoe R.	309.14	7/31 0930		<0.1	<0.1	<0.1	0.4	<0.1	<.002	.004	.003	.003	<.001	<.001	<.002	.026	.030	<.002	<.002	.009	.017	<.01	17	25	.003
2417	Wabash R. @ IN 225	309.14	7/31 0943		<0.1	<0.1	<0.1	0.4	<0.1	<.002	.004	<.002	.005	<.001	<.001	<.002	.024	.023	<.002	<.002	<.002	.017	<.01	14	<0.5	.002
2418	Wildcat Cr. @ Hwy 25		7/31 0955		<0.1	<0.1	<0.1	<0.1	<0.1	.029	<.002	<.002	<.002	<.001	<.001	<.002	.006	.006	<.002	<.002	<.002	<.002	<.01	15	<0.5	.003
2419	Wabash R. @ Jefferson H.S. Br.	301.50	7/31 1025		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.002	.011	.033	.003	<.001	.018	<.002	<.002	<.002	<.002	<.002	<.002	<.01	<0.1	1.2	.007
2237	W. Lafayette IN STP Eff.	301.15	8/7 0913		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2234	" " "	" "	8/6 1253		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	.038	<.001	--	--	--	--	--	--	--	--	1.9	<0.5	--
2251	Alton Box Board 001	301.00	8/6 1242		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2254	" " "	" "	8/7 0900		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2440	Rostone Corp. 001				<0.1	<0.1	<0.1	0.7	<0.1	.002	.005	.006	.009	<.01	<.001	<.002	.029	.033	<.002	<.002	<.002	<.002	<.01	25	<0.5	.003
2240	Lafayette STP Eff.	300.23	8/6 1200		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--	<.002	<.002	--	--	--	--
2243	" " "	" "	8/7 0825		<0.1	<0.1	<0.1	<0.1	<0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2261	Eli Lilly 001	298.8	8/6 1140		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	<.002	<.002	<.002	.073	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<0.01	<0.5	<.3	.17
2266	" " "	" "	8/7 0800		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	<.002	<.002	<.002	.029	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	0.5	<0.3	.090
2268	Eli Lilly 002	298.6	8/6 0931		<0.1	<0.1	<0.1	<0.1	<0.1	.002	.006	.008	<.002	.011	<.001	.003	.007	.008	<.002	<.002	<.002	<.002	<.01	0.9	0.8	<.002
2273	" " "	" "	8/7 0740		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.011	.004	<.002	.011	<.001	.003	<.002	.005	<.002	<.002	.008	.007	<.01	1.0	0.7	<.002
2565	Eli Lilly 003		8/6 1120		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	<.002	<.002	.016	<.001	<.001	.021	<.002	<.002	<.002	<.002	<.002	<.002	<.01	1.5	<0.5	<.002
2568	" " "		8/7 0730		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	<.002	<.002	<.002	<.001	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	1.8	<0.5	<.002
2444	Eli Lilly 004		8/7 0745		<0.1	1.6	<0.1	<0.1	<0.1	<.002	<.002	<.002	<.002	<.001	<.001	.063	<.002	<.002	<.002	<.002	<.002	<.002	<.01	1.0	0.3	.031
2420	Wabash R. below Eli Lilly	397.80	7/31 1140		<0.1	<0.1	<0.1	<0.1	<0.1	.011	.009	.010	.011	.011	<.001	.009	<.002	<.002	<.002	<.002	<.002	.006	<.01	0.9	0.9	.012
2421	Wea Creek at Mouth	297.70	7/31 1145		<0.1	<0.1	<0.1	<0.1	<0.1	.011	.015	.012	.018	.011	<.001	<.002	.007	.028	<.002	<.002	<.002	<.002	<.01	0.9	1.0	.003
2422	Wabash River at Granville Br.	292.00	7/31 1300		<0.1	<0.1	<0.1	<0.1	<0.1	.007	.012	.015	.007	.009	<.001	.003	<.002	<.002	.020	<.002	<.002	<.002	<.01	0.6	1.0	.006
2423	Wabash River at Independence	282.	7/31 1400		<0.1	<0.1	<0.1	<0.1	<0.1	.007	.012	.010	.005	.011	<.001	.014	<.002	<.002	<.002	<.002	<.002	.010	<.01	1.3	1.5	.008
2424	Big Pine Creek @ Mouth		7/31 143		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	<.002	<.002	<.002	.011	<.001	<.002	.014	<.002	<.002	<.002	<.002	.011	<.01	1.0	0.7	.008
2425	Wabash River @ Shawnee Bridge W-87	273.20	7/31 1510		<0.1	<0.1	<0.1	<0.1	<0.1	.007	.013	.008	<.002	.012	<.001	.010	.021	<.002	<.002	<.002	<.002	.013	<.01	0.6	2.3	.009

ENVIRONMENTAL PROTECTION AGENCY, INDIANA DISTRICT OFFICE
EVANSVILLE, INDIANA

TABLE III (Con't) Page 2

CHEMICAL DATA FOR THE WABASH RIVER

All data are reported in micrograms per liter

INDO Log No.	Location	Mile Point	Date 1974 Time	AROCHLORS						Lindane	HCHLR	ALDRIN	HCHLR-EP	Dieldrin	Endrin	Chlordane	o,p'-DDT	p,p'-DDT	o,p'-DDD	p,p'-DDD	o,p'-DDE	p,p'-DDE	Methx-yclr	Di-n-butyl phthalate	Di-(2-ethyl hexyl) phthalate	Alpha BHC
				1232	1221	1242	1248	1254	1260																	
2426	Wabash River 0.2 mi. above Olin				<0.1	<0.1	<0.1	<0.1	<0.1	.015	.014	.013	.004	.009	<.001	<.002	.012	<.002	<.002	<.002	.015	.012	<.01	1.1	1.4	<.002
2572	Wabash River @ Int. 74 Br. below Covington	260.	8/1 0825		<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.017	.009	<.002	.003	<.001	.002	.022	.015	<.002	<.002	.010	<.002	.19	0.4	1.7	<.002
2573	Vermillion R. @ Mouth	262.39	8/1 0930		<0.1	<0.1	<0.1	<0.1	<0.1	.007	.008	.010	.011	.010	<.001	.011	.080	.010	<.02	<.02	<.002	<.002	<.01	1.2	1.5	.007
2427	Wabash R. @ Manhattan Island				<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.017	.009	<.002	.007	<.001	<.002	.012	<.002	<.02	<.002	.013	<.002	.19	1.0	0.9	<.002
2428	Little Vermillion R. @ Mouth	237.10			<0.1	<0.1	<0.1	<0.1	<0.1	.007	.009	.010	.011	.018	<.001	.011	.028	<.002	.003	<.002	.013	.017	<.01	0.7	0.5	<.002
2429	Sugar Cr. at Mouth	233.80			<0.1	<0.1	<0.1	<0.1	<0.1	.011	.012	.019	<.002	.011	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	0.7	0.7	<.002
2431	Wabash R. @ Hwy 36 Montezuma, IN	228.11																								
2430	Raccoon Cr. @ Mouth	226.80			<0.1	<0.1	<0.1	<0.1	<0.1	.003	.011	.009	<.002	.009	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	0.5	<0.3	<.002
2432	Wabash R. @ Hwy 63	213.63			<0.1	<0.1	<0.1	<0.1	<0.1	.008	.009	.011	<.002	.014	<.001	<.002	.011	.013	<.002	<.002	<.002	<.002	<.01	0.8	0.6	<.002
2433	Wabash R. 0.1 mi. below Brouletts Cr.	214.6			<0.1	<0.1	<0.1	<0.1	<0.1	.013	.013	.021	.005	.009	<.001	<.002	<.002	<.002	<.002	<.002	<.002		<.01	0.7	1.1	.011
2434	Otter Cr. @ Mouth	211.80			<0.1	<0.1	<0.1	<0.1	<0.1	.022	.022	.009	.028	.005	<.001	<.002	.014	.009	<.002	<.002	.026	<.002	<.01	0.5	0.9	.023
2435	Lost Cr. @ Mouth	206.9			<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.008	.008	.089	.003	<.001	.039	.010	.003	.078	.022	<.002	<.002	<.01	2.8	0.8	.019
2436	Wabash R. @ Wabash Av. Br., Terre Haute IN	202.67			<0.1	<0.1	<0.1	<0.1	<0.1	.019	.013	.015	.002	.010	.001	.002	.036	.008	.002	.002	.002	.002	.01	0.8	0.7	.019
2479	Commercial Solvents 001	201.70	8/8 1105																					20		
2480	" " "		8/9 0810																					50		
2482	" " " 002	201.77	8/8 1130																					<10		
2483	" " "		8/9 0820																					<10		
2485	" " " 003	201.83	8/8 1140																					2310		
2486	" " "		8/9 0827																					210		
2487	" " " 004	201.60	8/8 1155																					10		
2498	Weston Paper & Mfg. Co. 001	201.0	8/9 0730	-- 0.1	<0.1 <0.1	<0.1 <0.1	<0.1 <0.1	<0.1 <0.1	<0.1	.041	.006	.003	<.002	.001	<.01	.003	<.002	<.002	<.002	<.002	.003	.005	<.01	2.9	3.5	<.002
2493	" " "		8/9 0935																							
2501	" " " 002	200.90	8/8 1015	--	<0.1	<0.1	<0.1	<0.1	<0.1	.009	.017	.019	.011	.006	<.001	.009	<.002	<.002	<.002	<.002	<.002	<.002	<.01	3.1	3.9	.016
2502	" " "	" "	8/9 0755	0.1	<0.1	<0.1	0.5	<0.1	<0.1																	
2506	" " " 004	222.9	8/8 0935	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.017	<.002	.003	<.001	<.001	.039	<.002	<.002	.009	.049	<.002	<.002	<.01	2.1	1.0	<.002
2507	" " "		8/9 0740	0.1	<0.1	<0.1	0.6	<0.1	<0.1																	

Environmental Protection Agency, Indiana District Office
Evansville, Indiana

TABLE III (Con't) Page 3

CHEMICAL DATA FOR THE WABASH RIVER

All data are reported in micrograms per liter

INDO Log No.	Location	Mile Point	Date 1974 Time	1221	1242	1248	1254	1260	1232	Lindane	HCHLR	ALDRIN	HCHLR-EP	Dieldrin	Endrin	Chlordane	o,p'-DDT	p,p'-DDT	o,p'-DDD	p,p'-DDD	o,p'-DDE	p,p'-DDE	Methxyclr	Di-n-butyl phthalate	Di-2-ethyl-hexyl phthalate	Alp BHC
2492	Terre Haute STP Eff.	197.60	8/8	<0.1	<0.1	<0.1	<0.1	<0.1	--	.004	.003	.006	.020	.032	.019	.031	<.002	<.002	<.002	<.002	<.002	<.002	<.001	2.9	<0.5	.022
2493	" " "	" "	8/9 0900	<0.1	0.6	<0.1	<0.1	<0.1	<0.1																	
2515	Pfizer (Jordan Creek)	191.1	8/13 1435	<0.1	<0.1	<0.1	0.8	<0.1	<0.1																	
2516	" " "	" "	8/14 1500	<0.1	<0.1	<0.1	0.7	<0.1	<0.1	<.002	.025	.035	.003	<.002	<.002	.003	<.002	<.002	.005	.007	<.002	<.002	<.01	0.9	0.9	.012
2532	" " " 002		8/13 1407	<0.1	<0.1	<0.1	0.5	<0.1	<0.1																	
2533	" " " "	" "	8/14 1430	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<.002	.006	.022	--	.005	<.002	.007	.016	.019	<.002	<.002	<.002	<.002	<.01	3.7	2.0	<.002
2529	" " " 003	" "	8/13 1420	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
2530	" " " "	" "	8/14 1445	<0.1	<0.1		0.5	<0.1	<0.1	<.002	.021	.024	.059	.001	<.002	<.002	<.002	<.002	<.002	<.002	.050	.005	<.01	1.0	0.7	.025
2437	Wabash River at Dresser Power Plant	193.50		<0.1	<0.1	<0.1	<0.1	<0.1	--	.006	.010	.010	.006	.013	<.001	.004	<.002	<.002	<.002	<.002	<.002	<.002	<.01	0.6	1.0	.015
2438	Honey Creek at Mouth	191.83		<0.1	<0.1	<0.1	<0.1	<0.1	--	.009	<.002	<.002	<.002	.007	<.001	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.01	0.4	<0.3	.010
3206	Wabash River @ New Harmony	43.1	5/23 1035	<.001	<.001	<.001	.212	<.001	<.001	.008	<.001	<.001	.030	<.001	<.001	.008	.005	<.001	.006	.005	.005	.036	.052	5.73	0.75	.006
3281	" " "	" "	6/20 1055	<.005	<.001	<.005	<.005	<.005	<.005	<.001	<.001	<.001	.003	.009	<.001	.009	.001	.015	.007	<.001	<.001	.018	<.002	21.3	8.0	<.001

APPENDIX D
PUBLIC WATER SUPPLIES UTILIZING SURFACE WATER IN WABASH RIVER BASIN - INDIANA (INTAKE LOCATIONS)*

(1/3)

Montpelier - at N. Adams Street at Salamonie River

Logansport - at power dam, midtown, on Eel River

Crane - Lake Greenwood
Washington - old alternate system - West Fork of White River, on U.S. 50 east

Greensburg - Flatrock River, 8 miles northwest of Greensburg, east of U.S. 421
Westport - Sand Creek, 1 mile east of Westport

Muncie - West Fork of White River, eastside of Muncie

Huntingburg - City Lake, 2.5 miles east of Huntingburg
Jasper - Potoka River, .5 miles east of S.R. 164 and Beaver Creek Reservoir
6 miles east of Jasper

Oakland City - Old Lake, Buck Creek, 1 mile northeast of Oakland City
- New Lake, tributary South Branch of Patoka River,
2 miles southeast of Oakland City

Kokomo - Wildcat Creek, just west of U.S. 31

Huntington - Wabash River, 1 mile south of Huntington

North Vernon - Muscatatuck River, 100 yards downstream of filtration plant

Warsaw - Center Lake

Bedford - East Fork of White River, 2 miles northwest of U.S. 50 and
Salt Creek, North of State Road 37
Mitchell - East Fork of White River, 2 miles northwest of Lawrenceport

Indianapolis - 1. Eagle Creek Reservoir at 56th Street
2. Morse Reservoir from White River, canal at 16th Street
3. Geist Reservoir from Fall Creek, 42nd and Kessler Avenue

Burns City - Lake Greenwood

Bloomington - Lake Monroe, Griffy Creek, 5 miles west of Bloomington

Paoli - Lick Creek, at 112 Braxton Street Paoli
West Baden - Lost River, .1 mile west of State Road 56

Winslow - Patoka River at State Road 61

Austin-Stucker Fork - Muscatatuck River, 2 miles northwest of Austin
Scottsburg - Scottsburg Lake
Terre Haute - Wabash River, between Tippecanoe and Elm Street,
downtown Terre Haute

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*Listing not complete, but major supplies are listed.

PUBLIC WATER SUPPLIES UTILIZING SURFACE WATER IN WABASH RIVER BASIN - INDIANA

(2/3)

Wolcott - Wolcott Impoundment, tributary of Tippecanoe River

Bluffton - Wabash River

Peru - Wabash River

Anderson - West Fork of White River

Speedway - Eagle Creek

Seymour - East Fork of White River

Petersburg - White River

Princeton - Patoka River

PUBLIC WATER SUPPLIES UTILIZING SURFACE WATER IN WABASH RIVER BASIN - ILLINOIS

Charleston - Channel Dam - Embarrass River

Clay City - Little Wabash River

Danville - Impoundment - North Fork Vermillion River

Effingham - Impoundment - Little Wabash River - Lake Sara

Fairfield - Little Wabash River

Flora - Little Wabash River

Georgetown - Little Vermillion River

Louisville - Little Wabash River

Mattoon - Impoundment - Little Wabash River

Mount Carmel - Wabash River

Neoga - Impoundment - Little Wabash River

Newton - Channel Dam - Embarrass River (3 wells used 90 percent of time)

Oakland - Impoundment - Tributary Embarrass River

Oakwood - Salt Fork Vermillion River

Olney - East Fork Lake - Vernon Lake - Fox River

Paris - Impoundment - Sugar Creek

Wayne City - Channel Dam - Skillet Fork Creek

West Salem - Impoundment - Branch Crooked Creek

4/24/75

APPENDIX E
(1/22)

NOTE: Appendix E consists of selected excerpts of titled survey report.

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

PRELIMINARY

SUBJECT TO REVISION

SURVEY OF ORGANIC, METAL AND OTHER INORGANIC PARAMETER CONCENTRATIONS IN SELECTED REGION V DRINKING WATER SUPPLIES

WATER DIVISION

AND

SURVEILLANCE AND ANALYS~~E~~IS DIVISION

230 South Dearborn Street

Chicago, Illinois 60604

April 15, 1975

INTRODUCTION

In response to public concern resulting from publicity about alledged toxic organic compounds in the New Orleans, La. and other municipal drinking water supplies, a national survey to study the extent of organic pollutants in eighty selected water supplies nationwide was initiated on February 3, 1975. The Region V study described in this report also began on February 3, 1975 and compl~~i~~ements the national survey by providing more current data pertaining to the drinking water supplies in Region V. The study was designed to evaluate the most serious instances of organic pollution in drinking water supplies, to collect information for a more intelligent assignment of resources for future studies, to provide concentration data that can then be related to toxicity information and to make preliminary estimates of any relationships that may occur between pollutant concentrations and sources of water or treatment of the water prior to distribution. In addition it was hoped the study would provide detailed information about the frequency of occurrence and concentration values of volatile and non-volatile organic compounds, selected pesticides, herbicides and fungicides, polychlorinated biphenyl mixtures, certain phthalate esters, metals and other inorganic parameters in drinking waters. Another interest was to establish baseline concentrations for those organic compounds alledged to be toxic, carcinogenic or which, because they may result from chlorination, are widely distributed in our water supplies. These values are important because they can be used to measure water quality improvements resulting from the Safe Drinking Water Act. These include carbon tetrachloride (CCl_4)

chloroform ($CHCl_3$), bromodichloromethane ($BrCHCl_2$), dibromochloromethane (Br_2CHCl), bromoform (Br_3CH), 1,2-dichloroethane ($Cl-CH_2-CH_2-Cl$), dichloromethane (CH_2Cl_2), aldrin, dieldrin and DDT.

Most cities were selected jointly by both State and Federal personnel, because it was suspected that their water might contain relatively high concentrations of organic pollutants. Others were chosen because they have an uncommon treatment process, medical records indicated a high incidence of cancer in the area, or to provide a comparison between different types of water sources.

A maximum number of parameters per sample were included to provide a complete description of each water supply and to detect possible relationships between the more traditional inorganic parameters and the organic parameters of current interest. In addition, since many expenses of the study, such as sampling costs, report writing, instrument and other fixed capitol depreciations, transportation, etc., remain constant, the most efficient study includes a maximum number of parameter analyses per sample. This wide parameter coverage has identified problems which would otherwise have been missed.

It should be emphasized that this study occurred during winter months when waters were cold, surface streams were generally at higher than normal flows and contained considerable suspended solid materials, agricultural and gardening activities were at a minimum as were certain industrial activities. Therefore, concentrations could vary substantially from values reported in this manuscript for samples collected at different times of the year.

II. SUMMARY OF RESULTS AND CONCLUSIONS

1. Volatile Organic Compounds

Table I is a summary of the analytical results.

TABLE I

Chemical Formula & Name	% of Samples Giving Positive Results		Mean Concentration (µg/l)		Maximum Concentration (µg/l)	
	Finished Water	Raw Water	Finished Water	Raw Water	Finished Water	Raw Water
$CHCL_3$ - Chloroform	95	27	20 µg/l	0	366 µg/l	94 µg/l
$CHBrCL_2$ - Bromodichloromethane	78	5	6 µg/l	0	91 µg/l	11 µg/l
$CHBr_2Cl$ - Dibromochloromethane	60	2	1 µg/l	0	14 µg/l	1.4 µg/l
$CHBr_3$ - Bromoform	14	0	<1 µg/l	0	7 µg/l	0 µg/l
CCl_4 - Carbon Tetrachloride	34*	18	*2 µg/l	0	*26 µg/l	20 µg/l
CH_2Cl_2 - Methylene chloride	8	1	<1 µg/l	0	7 µg/l	1 µg/l
$C_2H_4Cl_2$ - 1,2-Dichloroethane	13	14	<1 µg/l	0	26 µg/l	15 µg/l

* Those samples from Minnesota may have been contaminated by being exposed to laboratory air containing carbon tetrachloride.

Based on the data presented in Table I, it is clear[1,2] that chloroform, bromodichloromethane, dibromochloromethane and bromoform are being produced by the chlorination process at most cities in the Region. The mean concentrations however are quite low. Although the National Science Advisory Board is conducting preliminary studies to relate toxicities and concentrations of these compounds, the results are not available at this time.

Table II is a listing of the analytical results from which the summary data in Table I were calculated. The cities are ranked in order of increasing concentrations of chloroform found in their finished water. All concentrations are in micrograms per liter (µg/l). It is the practive of the Central Regional Laboratory to report detection limits based on each day's quality assurance data. Therefore, different detection limits are given for some parameters in Table II and other places in this report.

TABLE II

R = Raw F = Finished

City	$CHCl_3$		$BrCHCl_2$		Br_2CHCl		Br_3CH		CCl_4		CH_2Cl_2		$C_2H_4Cl_2$	
	R	F.	R	F	R	F	R	F	R	F	R	F	R	F
Richfield, Minn.	<1	<1	<1	<0.5	<1	<0.5	<1	<0.5	3	<2	<1	<1	<1	<0.5
Whiting, Ind.	<1	<1	<1	<0.5	<1	<0.5	<1	<0.5	<1	<1	<1	<0.5	<1	< 2
Waterford Twnshp, Mich.	<1	<1	<1	<0.2	<1	<0.2	<1	<0.2	<1	<1	<1	<0.5	<1	<1
Jackson, Mich.	<1	< 1	<1	16	<1	14	<1	3	<1	<1	<1	< 1	<1	3
Peoria, Ill.	<1	2	<1	1	<1	0.5	<1	0.4	<1	1.3	<1	<0.5	3	<1
Willmar, Minn.	<1	2	<1	<0.2	<1	<0.2	<1	<0.5	20	13	<1	<0.5	<1	<0.5
Milwaukee, Wisc.	2	2	<1	<.5	<1	<.5	<1	<.5	1	3	<1	<.5	<1	< 1
Kenosha, Wisc.	12	3	3	< 1	.7	1	<1	< 1	1	2	<1	<.5	<1	<1
Kalamazoo, Mich.	<1	4	<1	<0.5	<1	<0.5	<1	<0.5	<1	<1	<1	< 1	<1	< 1
Newton, Ill.	<1	4	<1	5	<1	4	<1	1.3	<1	<1	<1	<0.5	<1	< 2
Hammond, Ind.	<1	4	<1	<0.5	<1	<0.5	<1	<0.5	<1	1	<1	<0.5	<1	< 2
Granit Falls, Minn.	5	5	<1	<0.5	<1	<0.5	<1	<0.2	<1	7	<1	<0.5	<1	<0.5
Lafayette, Ind.	<1	5	<1	1	<1	0.3	<1	0.6	<1	<1	<1	<0.5	2	<1
Michigan City, Ind.	<1	5	<1	4	<1	1	<1	<0.5	<1	<0.5	<1	<0.5	<1	<2
Terre Haute, Ind.	4	5	<1	5	<1	6	<1	3	<1	< 1	<1	<0.5	15	<1
East Liverpool, Ohio	<1	5	<1	<0.5	<1	<0.5	<1	<0.5	[illegible]	6	<1	<0.5	<1	<1
Detroit, Mich.	<1	5	<1	6	<1	2	<1	0.3	<1	<1	<1	<0.5	<1	<1
Black River Falls, Wisc.	<1	6	<1	<.5	<1	<.5	<1	<.5	<1	< 2	<1	< 1	<1	<2

Rank	City	$CHCl_3$		$BrCHCl_2$		Br_2CHCl_2		Br_3CH		CCl_4		CH_2Cl_2		$C_2H_4Cl_2$	
		R	F	R	F	R	F	R	F	R	F	R	F	R	F
19-22	Gary, Ind.	<1	7	<1	5	<1	1	<1	<0.5	<1	1	<1	<0.5	<1	<2
"	Chicago, Ill.	<1	7	<1	3.4	<1	<1	<1	<1	<1	<1	<1	0	<1	<1
"	Logansport, Ind.	<1	7	<1	1.2	<1	<0.1	<1	<0.1	<1	<1	<1	<0.5	<1	<1
"	Crookston, Minn.	<1	7	<1	0.8	<1	<0.2	<1	<0.5	<1	5	<1	<0.5	<1	<1
23	Minneapolis, Minn.	<1	8	<1	<0.5	<1	<0.2	<1	<0.5	<1	5	<1	<0.5	<1	<1
24-25	Two Rivers, Wisc.	1	9	<1	4	<1	<1	<1	<.5	10	<2	<1	<.5	<1	<1
"	Green Bay, Wisc.	<1	9	<1	4	<1	<1	<1	<.5	0	<1	<1	<.5	<1	<1
26	Mankato, Minn.	2	10	<1	9	<1	2	<1	<0.5	3	5	<1	<0.5	<1	<1
27-29	Cleveland, Ohio	<1	10	<1	5	<1	0.7	<1	< 1	<1	9	<1	< 1	<1	<1
"	Lansing, Mich.	<1	10	<1	0.8	<1	0.7	<1	<1.3	<1	2	<1	< 1	4	<2
"	Mt. Clemens, Mich.	<1	10	<1	6	<1	1.3	<1	<0.1	<1	<1	<1	<0.5	9	<2
30-31	Mt. Pleasant, Mich.	<1	11	<1	23	<1	15	<1	3	<1	<1	<1	<0.5	<1	<1
"	South Bend, Ind.	<1	11	<1	3.4	<1	3	<1	2	<1	<1	<1	<0.5	<1	<1
32	Morocco, Ind.	<1	12	<1	10	<1	3	<1	0.3	<1	<1	<1	<0.5	<1	<1
33-36	Wyandotte, Mich.	<1	14	<1	7	<1	1	<1	0.4	<1	2.1	<1	< 1	<1	<2
"	Defiance, Oh.	2	14	<1	6	<1	0.7	<1	<0.2	<1	1	<1	<0.5	<1	<1
"	Cairo, Ill.	2	14	<1	11	<1	4	<1	0.8	2	1	1	<0.5	<1	<1
"	Manitowoc, Wisc.	<1	14	<1	6	<1	1	<1	<.5	<1	<1	<1	<.5	<1	<1
37	Danville, Ill.	6	16	<1	6	<1	1	<1	0.7	<1	<1	<1	< 1	<1	<2
38	Bay City, Mich.	<1	17	<1	19	<1	13	<1	7	<1	<1	<1	<0.5	3	<1

Rank	City	$CHCl_3$		$BrCHCl_2$		Br_2CHCl		Br_3CH		CCl_4		CH_2Cl_2		$C_2H_4Cl_2$	
		R	F	R	F	R	F	R	F	R	F	R	F	R	F
39	Mt. Vernon, Ind.	<1	18	<1	9	<1	1.2	<1	.9	<1	2	<1	1.5	<1	<1
40-41	Indianapolis, Ind.	<1	19	<1	6	<1	0.5	<1	0.6	<1	1	<1	2	3	<1
"	Bloomington, Ind.	<1	19	<1	5	<1	0.5	<1	<0.3	<1	1	<1	0.5	<1	<1
42	E. Grand Forks, Minn.	<1	22	<1	0.8	<1	<0.2	<1	<0.5	<1	8	<1	0.5	<1	<1
43	Grand Rapids, Mich.	<1	24	<1	10	<1	1	<1	<0.5	<1	1	<1	1	2	<2
44	Portsmouth, Ohio	2	25	<1	14	<1	4	<1	0.6	2	1	<1	3	2	<1
45-46	International Falls, Minn.	<1	26	<1	.3	<1	<0.5	<1	<1	<1	26	<1	1	<1	<1
"	Duluth, Minn.	<1	26	<1	1.5	<1	<0.5	<1	<1	<1	23	<1	1	<1	<1
47	Sault St. Marie Mich.	<1	27	<1	<0.5	<1	<0.5	<1	<0.5	<1	0.5	<1	0.5	<1	<1
48-49	Ft. Wayne, Ind.	4	29	<1	0.7	<1	0.4	<1	1	<1	0.9	<1	1	4	21
"	Evansville, Ind.	<1	29	<1	12	<1	1.7	<1	1	<1	1	<1	0.5	<1	<2
50-51	Galesburgh, Ill.	<1	30	<1	13	<1	2	<1	<0.2	<1	1	<1	1	<1	<1
"	Kokomo, Ind.	9	30	<1	11	<1	1.4	<1	0.3	<1	0.5	<1	0.5	<1	<1
52	Muncie, Ind.	<1	31	<1	17	<1	1	<1	<0.5	<1	1	<1	0.5	2	<1
53	Streator, Ill.	<1	35	<1	14	<1	1.7	<1	1.4	<1	1	<1	0.5	2	<1
54	St. Cloud, Minn.	<1	37	<1	4	<1	<0.2	<1	<0.5	<1	9	<1	0.5	<1	<1
55	New Albany, Ind.	3	41	.4	15	<1	1.4	<1	1	1	1.6	<1	1.3	2	<2
56	Menominee, Mich.	<1	42	<1	5	<1	.6	<1	0.3	<1	1	<1	1	3	<2

Rank	City	$CHCl_3$		$BrCHCl_2$		Br_2CHCl		Br_3CH		CCl_4		CH_2Cl_2		$C_2H_4Cl_2$	
		R	F	R	F	R	F	R	F	R	F	R	F	R	F
57-58	Cadillac, Mich.	<1	47	<1	8	<1	0.4	<1	<0.1	<1	1	<1	<0.5	2	<2
"	Fairfield, Ill.	10	47	3	16	<1	1.4	<1	<0.3	<1	<1	<1	<0.5	<1	<2
59	Carlyle, Ill.	<1	48	<1	20	<1	2	<1	0.6	<1	<1	<1	<0.2	<1	<1
60	Eau Claire, Wisc.	<1	50	<1	1	<1	<.5	<1	<1	<1	2	<1	7	<1	3
61	Columbus, Oh.	<1	51	<1	6	<1	0.7	<1	0.5	<1	<1	<1	<0.5	<1	<1
62-63	Kankakee, Ill.	<1	52	<1	10	<1	1.1	<1	<0.2	<1	1	<1	<0.5	<1	<1
"	Mt. Carmel, Ill.	<1	52	<1	15	<1	1	<1	<0.2	<1	<0.5	<1	2.6	<1	<1
64	Marinette, Wisc.	<1	53	<1	6	<1	<.5	<1	<.5	2	3	<1	<.5	<1	<1
65	Oshkosh, Wisc.	6	55	<1	5	<1	<.5	<1	<.5	7	<2	<1	<.5	<1	<1
66	Quincy, Ill.	<1	58	<1	13	<1	0.5	<1	<0.2	<1	<1	<1	<1	<1	<1
67	Berrea, Ohio	<1	60	<1	26	<1	4	<1	<1	<1	3	<1	<1	<1	<1
68	Toledo, Oh.	<1	62	<1	20	<1	4	<1	<.2	<1	<0.5	<1	<0.5	<1	<1
69	Royalton, Ill.	<1	68	<1	29	<1	6	<1	<0.1	<1	<1	<1	<0.5	<1	<1
70-71	Rock Island, Ill.	94	79	11	8.3	<1	0.4	<1	<0.2	<1	<1	<1	<1	<1	<1
"	Oslo, Minn.	3	79	<1	5	<1	<0.2	<1	<0.5	<1	7	<1	<0.5	<1	<5
72	St. Paul, Minn.	4	82	<1	6	<1	<0.2	<1	<0.5	2	12	<1	<0.5	<1	<5
73	Bedford, Ind.	5	84	<1	12	<1	0.8	<1	0.8	<1	2	<1	<0.5	<1	<1
74	Piqua, Ohio	<1	102	<1	10	<1	0.7	<1	<0.1	<1	<1	<1	<0.5	<1	<1
75	Cincinnati, Ohio	4	127	<1	29	1.4	3	<1	<.5	1	<.5	<1	<.5	<1	<1
76	Breckenridge, Minn.	<1	128	<1	15	<1	<0.5	<1	<2	4	12	<1	<1	<1	<3

Rank	City	$CHCl_3$		$BrCHCl_2$		Br_2CHCl		Br_3CH		CCl_4		CH_2Cl_2		$C_2H_4Cl_2$	
		R	F	R	F	R	F	R	F	R	F	R	F	R	F
77	Warren, Ohio	<1	138	<1	19	<1	0.8	<1	<.2	<1	11	<1	<0.5	<1	<1
78	Bowling Green, Ohio	<1	160	<1	27	<1	5	<1	<1	<1	<.5	<1	<.5	<1	<1
79	Dundee, Mich.	<1	170	<1	26	<1	2	<1	0.3	<1	<1	<1	<0.5	<1	<1
80	Chester, Ill.	5	182	<1	17	<1	1.1	<1	<0.3	<1	<1	<1	<0.5	<1	<1
81	Fairmount, Minn.	9	200	<1	31	<1	0.7	<1	<0.5	<1	<1	<1	<0.5	<1	<5
82	Bessemer, Mich.	7	312	<1	4	<1	<0.2	<1	<0.5	<1	6.5	<1	<0.5	<1	<1
83	Fremont, Ohio	1	366	<1	18	<1	1.4	<1	<.5	<1	3	<1	<.5	<1	<1
	Mean	2	45	<1	8.5	<1	1.2	<1	0.4	<1	<1	<1	<1	<1	<1
	Median	<1	20	<1	6	<1	1	<1	<1	<1	<1	<1	<1	<1	<1

Conclusions that may be reached from an examination of the data in Table II are as follows:

a. Clean raw water,as based on the COD and other parameter concentrations,results in finished water that is free of chloroform and related halogenated compounds. Of the 25 supplies having the lowest concentrations of chloroform, 12 obtain their water from the Great Lakes, 8 from deep wells and only 5 from surface sources.

b. Chloroform, bromodichloromethane, dibromochloromethane, and bromoform result from chlorination of pollutants in the raw water. Since there is no pattern to their occurrence, it does not appear that carbon tetrachloride, methylene chloride or 1,2-dichloroethane are produced by the chlorination process.

c. Using only the more accurate data (higher concentrations can be measured more accurately than lower concentrations) for those cities having over 100 µg/l of chloroform in their finished water, the concentration ratio percentages (see Table III) of $BrCHCl_2$ to $CHCl_3$ range from 1.2 to 17. The range for the $BrCHCl_2/Br_2CHCl$ ratios is 0 to 19. A careful examination of these ratios suggests that the concentration of $BrCHCl_2$ will be approximately 13% that of $CHCl_3$ and the concentration of Br_2CHCl will be about 6% that of $BrCHCl_2$. This relatively constant ratio indicates a common precursor or group of precusors of the halogenated

TABLE III

CONCENTRATION RATIOS FOR THE TEN MOST POLLUTED WATER SUPPLIES

Concentration units are in μg/l

	$CHCl_3$	$BrCHCl_2$	Br_2CHCl	$CHBr_3$	$\frac{BrCHCl_2}{CHCl_3}$	$\frac{Br_2CHCl}{BrCHCl_2}$
Fremont, Ohio	366	18	1.4	0	4.9*	8
Bessemer, Mich.	312	4	0	0	1.2*	0
Fairmount, Minn.	200	31	0.7	0	15.	2
Chester, Ill.	182	17	1.1	0	9.3	6
Dundee, Mich.	170	26	2	0	15.	8
Bowling Green, Ohio	160	27	5	0	17.	19
Warren, Ohio	138	19	0.8	0	14.	4
Breckenridge, Minn.	128	15	0	0	12.	0
Piqua, Ohio	102	10	0.7	0	10.	7
Bedford, Ind.	84	12	0.8	0.8	14	7
				Ave. Std. Dev.	13.3 2.6	6.1 5.5

*excluded from calculation of average and standard deviation. If all data in Table II are used, both ratio percentages and the scatter increase as the measurements approach the detection limit

d. The use of carbon filters is not effective as was practiced by the water treatment plants during the time of this study. (See Table II). We suspect that most of those cities presently using carbon have chosen to do so to reduce taste and odor problems resulting from unusually polluted raw water supplies and that the carbon is much more effective in removing those compounds causing the water to have a taste and odor than it is in removing the halogenated methanes or other organic compounds that react to form chloroform.

e. The Region V study was designed to compl~~i~~ement the National Study which is more limited in parameter coverage and based on a slightly different strategy than the Regional survey. Although no attempt was made in Region V to select cities based on population, as was done in the National Study, the resulting list of cities sampled does include a complete range of population sizes. These have been summarized and compared to the average chloroform concentration found for each class as shown below in Table IV.

TABLE IV

Population Class in Thousands	% of Cities Sampled	% of Population Included in Study	AveragesChloroform Concentration
1,000-4,000	2.4	48.8	6 µg/l
500-1,000	4.8	18.5	10 µg/l
100- 500	16.9	20.5	33 µg/l
50 - 100	19.3	6.7	33 µg/l
0 - 50	56.6	5.5	56 µg/l

It is obvious from the data that, while the majority of the population sampled is using water with a chloroform concentration considerably less than 33 μg/l, the majority of people living in smaller communities are using water with much higher concentrations of chloroform. Since 34% of the total population of Region V (approximately 44 million) was included in this survey, one may safely conclude that the survey was representative and that 14 million people in the Region were using water containing over 30 μg/l of chloroform at the time these samples were collected.

2. Pesticides, PCB's and Phthalates

Table V is a listing of those cities where pesticides, PCB's and/or phthalates were identified. The other samples analyzed did not contain a detectable amount of any of the fifty pesticides included in the survey. All analytical results are included in the appendix and from these we conclude that:

a. A large majority of the samples do not contain these types of compounds in concentrations that can be measured with the procedures used for this study.

b. For this class of compounds, the most commonly found are diethylhexylphthalate, dieldrin, DDT, treflan, aldrin and hexachlorobenzene. Unforunately, aldrin, dieldrin and DDT are suspected carcinogens and therefore of concern even at these very low concentrations. The concentrations of all pesticide type compounds identified to date are low. Excluding the phthalates, the highest concentrations found were

68 nanograms per liter (ng/l) for DDT, 11 ng/l for dieldrin, 17 μg/l for diethylhexglphthalate and 50 ng/l for treflan. All positive results are given in Table V.

c. It is of interest to note that the concentrations of PCB's in those samples from Lake Michigan and the Ohio River were too low to detect. Therefore, if PCB studies of these bodies of waters is to continue, a strong emphasis should be placed on the analysis of fish and other biological samples where these compounds have been concentrated naturally rather than on water samples. Alterna~~lly~~tely sediment samples may be analyzed if an analytical method can be developed.

TABLE V

PESTICIDES - POLYCHLORINATED BIPHENYLS - PHTHALATES

Concentration is nanograms per liter , R = Raw F = Finished

City		Diethylhexyl Phthalate	DDT	Dieldrin	Treflan	HCB Hexachloro benzene	Aldrin	Zytron	Lindane	2,4-D(IP) 2,4-D-isopropyl ester	Gamma Chlordane	Total Value #
Bedford, Ind.	R			8								1
	F			6								1
Ft. Wayne, Ind.	R	1000										1
	F	4000		7								2
Gary, Ind.	R	17000										1
	F	5000										1
Hammond, Ind.	R		14									1
	F											
Indianapolis,In.	R											
	F		6									1
Kokomo, Ind.	R		32									1
	F											
Lafayette, Ind.	R						10			50		2
	F						4					1
Logansport, Ind.	R		16									1
	F											
Michigan City,In.	R	3000										1
	F											
Morocco, Ind.	R							40				1
	F											
Muncie, Ind.	R											
	F											
Mt. Vernon, Ind.	R			3								1
	F											
New Albany, Ind.	R			6								1
	F		14									1
South Bend, Ind.	R	4000	6	7								3
	F	2000										1
Cairo, Ill.	R	1000	6	4		10						4
	F	3000										1
Carlyle, Ill.	R		8									1
	F											
Chester, Ill.	R											
	F	3000	68	7							4	4
Galesburg, Ill.	R											
	F					4						1
Kankakee	R				10							1
	F			4								1

All Concentration Values Not Reported Were Below the Detection Limits

PESTICIDES - POLYCHLORINATED BIPHENYLS - PHTHALATES

Concentration is nanograms per liter R = Raw F = Finished

City		Diethylhexyl Phthalate	DDT	Dieldrin	Treflan	HCB Hexachloro benzene	Aldrin	Zytron	Lindane	2,4-D(IP) 2,4-D-isopropyl ester	Gamma Chlordane	Total Value #
Mt. Carmel , Ill.	R			11	28							2
	F			6	50							2
Peoria. Ill.	R											
	F											
Streator, Ill.	R			3								1
	F								4			1
Rock Island, Ill.	R											
	F		12									1
Bay City, Mich.	R	1000										1
	F	1000										1
Bessemer Twp. Mich.	R	1000										1
	F											
Cadillac, Mich.	R											
	F											
Detroit, Mich.	R											
	F											
Dundee, Mich.	R		4	5	7							3
	F						6					1
Jackson, Mich.	R	2500										1
	F											
Mt. Pleasant Mich.	R		4									1
	F		6									1
Sault St. Marie Mich.	R											
	F											
Wyandotte, Mich.	R	1000										1
	F											
Crookston, Minn.	R											
	F	1000				6						1
Duluth, Minn.	R	1000										1
	F	2000										1
East Grand Forst Minn.	R	2000				6						2
	F	1000										1
Fairmont, Minn.	R	1000										1
	F											
Minneapolis, Minn.	R	6000										1
	F											
Oslo, Minn.	R					6						1
	F											

PESTICIDES - POLYCHLORINATED BIPHENYLS - PHTHALATES
Concentration is nanograms per liter R = Raw F = Finished

City		Diethylhexyl Phthalate	DDT	Dieldrin	Treflan	HCB Hexachloro benzene	Aldrin	Zytron	Lindane	2,4-D(IP) 2,4-D-isopropyl ester	Gamma Chlordane	Total Value #
Richfield, Minn.	R											
	F	2000										1
St. Cloud, Minn.	R	2000	8				6					3
	F											
Berrea, Ohio	R	4000										1
	F	2000										1
Cincinnati Ohio	R	2000		3								2
	F	17000										1
Cleveland, Ohio	R	1000										1
	F	2000										1
Columbus, Ohio	R	1000										1
	F											
East Liverpool Ohio	R		10									1
	F	1000										1
Portsmouth, Ohio	R											
	F											
Toledo, Ohio	R											
	F	4000										1
Green Bay, Wisc.	R											
	F	2000										1
Kenosha, Wisc.	R	2000										1
	F	1000										1
Marinette, Wisc.	R											
	F	1000										1
Milwaukee Wisc.	R	12000										1
	F											
Oshkosh, Wisc.	R											
	F	1000										1
Two Rivers, Wisc.	R											
	F	6000										1
Total # Values		40	15	14	4	5	4	1	1	1	1	86

3. Non-Volatile Organic Compounds

Finished water was passed through carbon filters at Mt. Vernon, Evansville and Indianapolis, Indiana. Raw water samples were also collected at Mt. Vernon. Presently the water from Whiting, Indiana and Mt. Carmel, Illinois are being sampled. All of the exposed filters have been extracted with hexane, chloroform and methanol. Each of the extracts has been separated into acidic, basic and neutral fractions giving a total of nine concentrates per filter. The following high boiling compounds have been identified in the Mt. Vernon and Evansville supplies:

Mt. Vernon	Evansville
tri-n-butyl phosphate	tri-n-butyl phosphate
butylphthalate	butylphthalate
dioctyl phthalate	dioctyl adipate
trimethyl benzene	methyl palminate
toluene	farnesol
n-octane and other homologs	n-octane and other homologs
xylene	xylene
ethyl benzene	diphenylether
methyl cyclohexane	

Many more of these high boiling compounds are present, but further purification (we are attempting to accomplish the preparation by high pressure liquid chromatography techniques) will be necessary to identify them. We have not yet attempted to analyze the extracts for any low boiling compounds except for the bis-2-chloroisopropyl and bis-2-chloroethyl ethers. Neither of these compounds gave a gas chromatographic peak above the detection limit and therefore they are not present to the extent they have been in Evansville samples analyzed previously. In general, the current water samples from Evansville are much less polluted than were similar samples analyzed by this laboratory and Indiana State University Evansville over the previous four years. This reduction in pollution is an expected product of the permit program and should reduce concern for Evansville water.

III. Recommendations

1. The use of water from those wells at Kokomo that are contaminated with arsenic should be terminated. All other well waters in the area should be analyzed for arsenic as soon as possible.
2. Since our results are based on individual grab samples collected at what may not be normal conditions, the data may not reflect the long term quality of any given supply. Therefore, the finished water of those 31 supplies showing chloroform concentrations above 33 µg/l should be analyzed for the volatile organic compounds and selected metal and other inorganic parameters. This level of monitoring is suggested based on data presented previously showing that 30% of the population is exposed to 33 µg/l of chloroform. In addition, a complete organic compound analysis should be completed on as many of these water supplies as possible.
3. An effort should be made to identify the precursor(s) that react with chlorine and bromine to produce the pollutants found in the finished water samples. As a first step, raw waters should be analyzed completely

and halogenation studies completed on potential precursors. The best treatment for these pollutants may be removal of a precursor rather than removal of the organic compounds found in the finished water supplies. Raw water samples should be taken and analyzed completely at those cities having the highest chloroform concentrations.

4. It is our understanding that the Cincinnati Water Supply Research Laboratory is conducting studies to evaluate the cost and effectiveness of various treatment methods. The different carbon, ozone and standard processes have been discussed. We suggest that they also include a study of aeration in their program as a method of removing volatile organic compounds.
5. This work has established that the most serious volatile organic pollution problems occur in cities with a population less than 50,000. Therefore, it is recommended that the major research efforts be directed toward treating many small volumes of water rather than toward a few large plants.
6. The Science Advisory Board is to complete a preliminary report by May 1, 1975 relating toxicity and concentration of selected organic compounds included in this

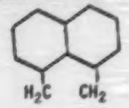
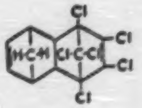
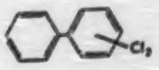
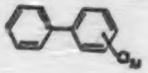
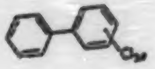
study. We recommend that they complete the evaluation for both acute and chronic toxic effects and for carcinogenic activity for the seven volatile organics studies, treflan, diethylhexyl, phthalate, DDT, Aldrin and Dieldrin.

7. The relationship of COD and $CHCl_3$ concentrations should be further investigated to include raw water source comparisons and other parameter correlations such as pH to act as indicators for volatile organics.

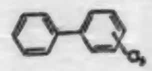
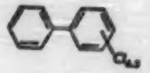
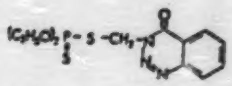
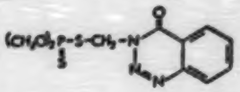
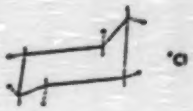
8. Fast and easy measurements such as specific conductance and alkalinity should be investigated as methods of screening supplies for undesirable levels of sulfates, chlorides, dissolved solids, and hardness. This would reduce the necessary resources to screen and evaluate large numbers of drinking water supplies.

9. The best methods of purification and treatment of drinking water supplies should be standardized. The variations in the treatment processes as shown in Table XI indicate that presently the type of water conditioning depends more on the state than type of water source.

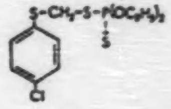
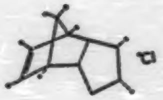
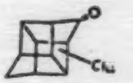
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
1	Acenaphthene	$C_{12}H_{10}$	Naphthalene ethylene, 1,2-dihydroacenaphthylene		Dye intermediate, plastics manufacture; insecticide, fungicide
2	Aldrin	$C_{12}H_8Cl_6$	1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4-*endo-exo*-5,8-dimethanonaphthalene		Insecticide
3	Aroclor 1016	$C_{12}H_7Cl_3$	Polychlorinated biphenyl with 41.5% Cl		Industrial dielectric
4	Aroclor 1242	$C_{12}H_{6.9}Cl_{3.1}$	Polychlorinated biphenyl with 42% Cl		Industrial dielectric
5	Aroclor 1248	$C_{12}H_{6.1}Cl_{3.9}$	Polychlorinated biphenyl with 48% Cl		Industrial dielectric

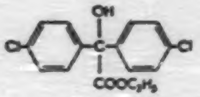
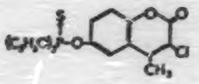
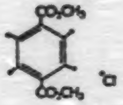
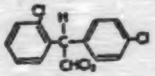
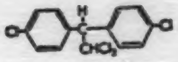
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
6	Aroclor 1254	$C_{12}H_5Cl_5$	Polychlorinated biphenyl with 54% Cl		Industrial dielectric
7	Aroclor 1260	$C_{12}H_{3.7}Cl_{6.3}$	Polychlorinated biphenyl with 60% Cl		Industrial dielectric
8	Azinphos Ethyl (Ethyl Guthion)	$C_{12}H_{16}N_3O_3PS_2$	0,0-Diethyl S-[4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl] phosphorodithioate		Insecticide
9	Azinphos Methyl (Gutnion)	$C_{10}H_{12}N_3O_3PS_2$	0,0-Dimethyl S-[4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl] phosphorodithioate		Insecticide
10	BHC, Beta Isomer	$C_6H_6Cl_6$	Beta isomer of hexachloro-Cyclohexane		Insecticide

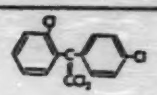
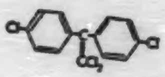
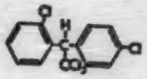
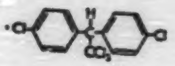
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
11	Bulan	$C_{16}H_{15}Cl_2NO_2$	1,1-Bis(p-chlorophenyl)-2-nitrobutane		Insecticide (component of Dilan)
12	Carbon Disulfide	CS_2	Carbon bisulfide	S = C = S	[illegible]; manuf. rayon; varnishes; insecticide
13	Carbophenothion (Trithion)	$C_{11}H_{16}ClO_2PS_3$	S-[(p-Chlorophenylthio)methyl] O,O-diethyl phosphorodithioate		Insecticide; miticide
14	Chlordane, Gamma (trans-chlordane)	$C_{10}H_6Cl_8$	1-*exo*,2-*endo*,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene		Insecticide
15	Chlordecore (Kepone)	*$C_{10}Cl_{10}O$	Decachloro-octanydro-1,3,4-metheno-2H-cyclobuta[cd]-pentalen-2-one		Insecticide

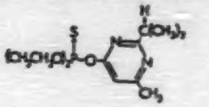
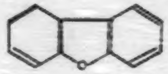
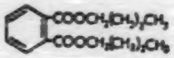
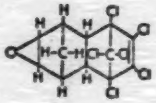
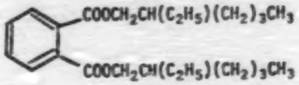
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
16	Chlorobenzilate (Acaraben)	$C_{16}H_{14}Cl_2O_3$	Ethyl 4,4'-dichlorobenzilate		Miticide
17	Coumaphos (Co-Ral)	$C_{14}H_{16}ClO_5PS$	O-(3-Chloro-4-methyl-2-oxo-2H-1-benzopyran-7-yl)O,O-diethyl phosphorothioate		Insecticide
18	DCPA (Dacthal)	$C_{10}H_6Cl_4O_4$	Dimethyl 2,3,5,6-tetrachloroterephthalate		Herbicide
19	DDD, o,p'	$C_{14}H_{10}Cl_4$	2-(o-Chlorophenyl)-2-(p-chlorophenyl)-1,1-dichloroethane		Insecticide
20	DDD, p,p'	$C_{14}H_{10}Cl_4$	2,2-Bis(p-chlorophenyl)-1,1-dichloroethane		Insecticide

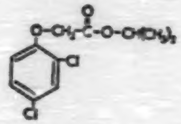
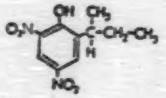
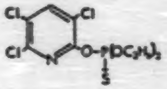
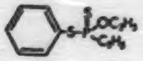
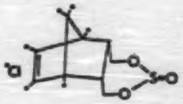
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
21	DDE, o,p'	$C_{14}H_8Cl_4$	1,1-Dichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)ethylene		Insecticide
22	DDE, p,p'	$C_{14}H_8Cl_4$	1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene		Insecticide
23	DDT, o,p'	$C_{14}H_9Cl_5$	1,1,1-Trichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)ethane		Insecticide
24	DDT, p,p'	$C_{14}H_9Cl_5$	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane		Insecticide
25	DEF	$C_{12}H_{27}OPS_3$	S,S,S-Tributyl phosphorotrithioate	$(CH_3CH_2CH_2CH_2S)_3P{=}O$	Defoliant

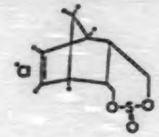
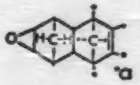
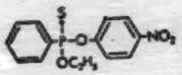
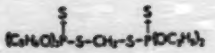
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
26	Diazinon (Spectracide)	$C_{12}H_{21}N_2O_3PS$	0,0-Diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate		Insecticide
27	Dibenzofuran	$C_{12}H_8O$	Diphenylene oxide		Insecticide
28	Dibutyl Phtalate (DBP)	$C_{16}H_{22}O_4$	Di-*n*-butyl phthalate		Insect repellant; plasticizer; cellophane; dyes
29	Dieldrin (HEOD)	$C_{12}H_8Cl_6O$	1,2,3,4,10,10-Hexachloro-*exo*-6,7-expoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-*endo*,*exo*-5,8-dimethanonaphthalene		Insecticide
30	Diethylhexyl Phthalate	$C_{24}H_{38}O_4$	DEHP or dioctyl phthalate.		Vacuum pumps; plasticizer

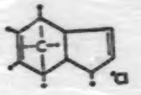
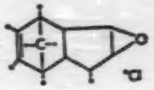
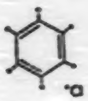
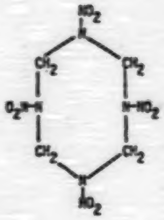
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
31	2,4-D, Isopropyl Ester	$C_{11}H_{12}Cl_2O_3$	2,4-Dichlorophenoxyacetic acid, isopropyl ester		Herbicide
32	Dinoseb (DNBP)	$C_{10}H_{12}N_2O_5$	2-(*sec*-Butyl)-4,6-dinitrophenol		Herbicide
33	Chlorpyrifos (Dursban)	$C_9H_{11}Cl_3NO_3PS$	O,O-Diethyl O-(3,5,6-trichloro-2-pyridyl) phosphorothioate		Insecticide
34	Fonofos (Dyfonate)	$C_{10}H_{15}OPS_2$	O-Ethyl S-phenyl ethyl=phosphonodithioate		Insecticide
35	Endosulfan I	$C_9H_6Cl_6O_3S$	The early eluting, low melting (106°C) isomer of Endosulfan		Insecticide

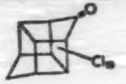
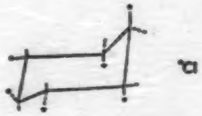
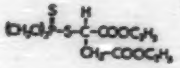
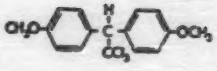
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
36	Endosulfan II	$C_9H_6Cl_6O_3S$	The late eluting, high melting (212°C) isomer of Endosulfan		Insecticide
37	Endrin	$C_{12}H_8Cl_6O$	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-*endo*,*endo*-5,8-dimethanonaphthalene		Insecticide
38	EPN	$C_{14}H_{14}NO_4PS$	O-Ethyl O-p-nitrophenyl phenyl=phosphonothioate	 S P O NO₂ OC₂H₅	Acaricide and insecticide
39	Ethion	$C_9H_{22}O_4P_2S_4$	0,0,0',0'-Tetraethyl S,S'-methylene bisphosphoro=dithioate	 $(C_2H_5O)_2\overset{S}{\overset{\|}{P}}-S-CH_2-S-\overset{S}{\overset{\|}{P}}(OC_2H_5)_2$	Insecticide and miticide
40	Ethyl Oleate	$C_{20}H_{38}O_2$	Ethyl Oleate	$CH_3-(CH_2)_7-CH=CH-(CH_2)_7-COOC_2H_5$	Oil thickening; waterproofing; varnishes

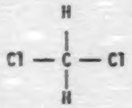
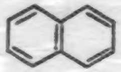
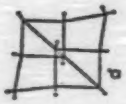
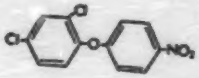
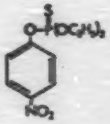
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
41	Heptachlor	$C_{10}H_5Cl_7$	1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene		Insecticide
42	Heptachlor Epoxide	$C_{10}H_5Cl_7O$	1,4,5,6,7,8,8-Heptachloro-2,3-epoxy-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene		Insecticide
43	Hexachlorobenzene (HCB)	C_6Cl_6	Hexachlorobenzene		Fungicide
44	HMX	$C_4H_8O_8N_8$	Cyclotetramethylenetetranitramine		Explosive; propellant
45	Isopropyl Alcohol	C_3H_8O	Isopropanol	$CH_3CHOHCH_3$	Solvent; antifreeze additive; ink additive

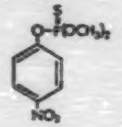
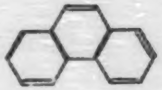
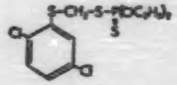
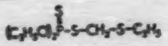
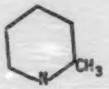
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
46	Chlordecone (Kepone)	*$C_{10}Cl_{10}O$	Decachloro-octahydro-1,3,4-metheno-2H-cyclobuta[cd]-pentalen-2-one		Insecticide
47	BHC, Gamma Isomer (Lindane)	$C_6H_6Cl_6$	Gamma isomer of hexachloro-cyclohexane		Insecticide
48	Malathion	$C_{10}H_{19}O_6PS_2$	Diethyl mercaptosuccinate, s-ester with 0,0-dimethyl phosphorodithioate	 $(CH_3O)_2\overset{S}{P}-S-\underset{CH_2-COOC_2H_5}{\overset{H}{C}}-COOC_2H_5$	Insecticide
49	Methoxychlor (Marlate)	$C_{16}H_{15}Cl_3O_2$	2,2-Bis(p-methoxyphenyl)-1,1,1-trichloroethane		Insecticide
50	Methylamine	CH_5N	Methylamine	CH_3NH_2	Tanning agent; organic synthesis

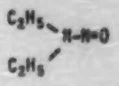
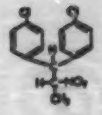
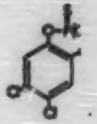
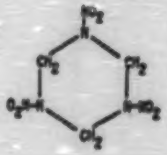
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
51	Methylene Chloride	CH_2Cl_2	Dichloromethane	 $\mathrm{Cl}-\overset{\displaystyle \mathrm{H}}{\underset{\displaystyle \mathrm{H}}{\mathrm{C}}}-\mathrm{Cl}$	Solvent; degreasing and cleaning fluids
52	Naphthalene	$C_{10}H_8$	Naphthalin		Manufacture of organic chemicals and synthetic resins; moth repellant
53	Mirex (Dechlorane)	$C_{10}Cl_{12}$	Dodecachlorooctahydro-1,3,4-metheno-2H-cyclobuta[cd]-pentalene		Insecticide
54	Nitrofen (TOK)	$C_{12}H_7Cl_2NO_3$	2,4-Dichlorophenyl-*p*-nitrophenyl ether		Herbicide
55	Parathion Ethyl	$C_{10}H_{14}NO_5PS$	O,O-Diethyl-O-*p*-nitrophenyl phosphorothioate		Insecticide

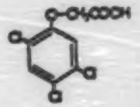
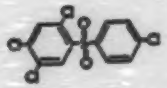
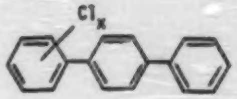
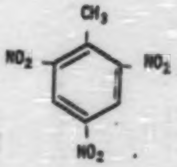
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
56	Parathion Methyl	$C_8H_{10}NO_5PS$	O,O-Dimethyl O-*p*-nitrophenyl phosphorothioate		Insecticide
57	Phenanthrene	$C_{14}H_{10}$	O,O-Dimethyl O-*p*-nitrophenyl phosphorothioate		Coal tar derivative; organic reactant
58	Phencapton	$C_{11}H_{15}Cl_2O_2PS_3$	O,O-Diethyl-S-(2,5-dichlorophenylthiomethyl)phosphorothiolothionate		Acaricide
59	Phorate (Thimet)	$C_7H_{17}O_2PS_3$	O,O-Diethyl S-[(ethylthio)methyl]phosphorodithioate	 $(C_2H_5O)_2\overset{S}{P}\text{-S-}CH_2\text{-S-}C_2H_5$	Insecticide
60	Picoline (Alpha)	C_6H_7N	2-Methylpyridine		Solvent; dye and resins manufacture

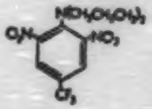
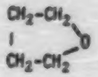
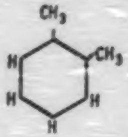
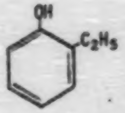
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
61	Diethyl Nitrosamine	$C_4H_{10}N_2O$	Nitrosodiethylamine	 $(C_2H_5)_2N{-}N{=}O$	Synthesis of drugs, herbicides, and dyes
62	Prolan	$C_{15}H_{13}Cl_2NO_2$	1,1-Bis(p-chlorophenyl)-2-nitropropane		Insecticide
63	Phosalone (Zolone)	$C_{12}H_{15}ClNO_4PS_2$	S-[(6-Chloro-2-oxo-3-benzoxazolinyl)methyl] O,O-diethyl phosphorodithioate		Insecticide
64	Ronnel	$C_8H_8Cl_3O_3PS$	O,O-Dimethyl O-(2,4,5-trichlorophenyl) phosphorothioate		Insecticide
65	RDX	$C_3H_6N_3O_6$	Cyclotrimethylenetrinitramine		Explosive; propellant

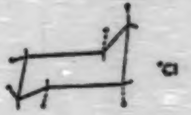
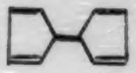
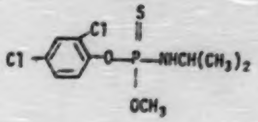
GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
66	Stearic Acid	$C_{18}H_{36}O_2$	Octadecanoic Acid	$CH_3(CH_2)_{16}COOH$	Manufacture of rubber, organics, and cosmetics; plasticizer
67	2,4,5-T, Acid	$C_8H_5Cl_3O_3$	2,4,5-Trichlorophenoxyacetic acid		Herbicide
68	Tetradifon (Tedion)	$C_{12}H_6Cl_4O_2S$	4-Chlorophenyl 2,4,4-trichlorophenyl sulfone		Miticide
69	Terphenyls (Polychlorinated)	$C_{18}H_{14-x}Cl_x$	Polychlorinated terphenyls		Hydraulic fluid; waxes
70	TNT	$C_7H_5N_3O_6$	Trinitrotoluene		Explosive; propellant

GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
71	Trifluralin (Treflan)	$C_{13}H_{16}F_3N_3O_4$	α,α,α-Trifluoro-2,6-dinitro-N,N-dipropyl-*p*-toluidine		Herbicide
72	Tetrahydrofuran	C_4H_8O	Diethylene oxide		Solvent; plastics manufacture
73	Xylene	C_8H_{10}	Dimethylbenzene		Solvent; dye manufacturer
74	Ethylphenol	$C_8H_{10}O$	Phlorol		Disinfectant; manufacture resins and dyes
75	Isodrin	$C_{12}H_8Cl_6$	*Endo-endo* isomer of Aldrin	See Aldrin	Insecticide

GLOSSARY OF TOXIC/HAZARDOUS ORGANIC COMPOUNDS

Number	Common Name	Empirical Formula	Chemical Name	Structure	Use
76	BHC, Alpha Isomer	$C_6H_6Cl_6$	Alpha isomer of hexachloro-cyclohexane		Insecticide
77	Farsenol	$C_{10}H_8$	Farsenol		Manufacture of resins; organic synthesis
78	Zytron	$C_{10}H_{14}Cl_2NO_2PS$	Isopropylphosphoramidothioic acid O-2,4-dichlorophenyl O-methyl ester		Herbicide